Draft Environmental Impact Statement on the Makah Tribe Request to Hunt Gray Whales

February 2015

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service, West Coast Region

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

Dear Reviewer:

In accordance with provisions of the National Environmental Policy Act (NEPA), we enclose for your review the National Oceanic and Atmospheric Administration (NOAA) *Draft Environmental Impact Statement (DEIS) on the Makah Tribe Request to Hunt Gray Whales*.

This DEIS is prepared pursuant to NEPA to assess the environmental impacts associated with the National Marine Fisheries Service (NMFS) review and evaluation of the Makah Indian Tribe's request for authorization under the Marine Mammal Protection Act and Whaling Convention Act to resume treaty-based hunting of eastern North Pacific gray whales (*Eschrichtius robustus*) for ceremonial and subsistence purposes.

Additional copies of the DEIS may be obtained from the Responsible Program Official identified below. The document is also accessible electronically through the NMFS West Coast Region's website at http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/cetaceans/whale_hunt.html.

Written comments should be submitted through mail, facsimile (fax), or email to the Responsible Program Official identified below. Written comments submitted during the agency's 90-day public comment period must be received by June 11, 2015. When submitting fax or email comments, include the following document identifier in the comment subject line: 2015 Makah DEIS.

Responsible Program Official: William W. Stelle, Jr.
Regional Administrator
National Marine Fisheries Service, West Coast Region
National Oceanic and Atmospheric Administration
7600 Sand Point Way NE, Building 1
Seattle, WA 98115-0070
(206) 526-6150 Telephone
(206) 526-6426 Fax
Makah2015DEIS.wcr@noaa.gov

Sincerely,

MONTANIO.PATRICIA.A.1365839030
Digitally signed by MONTANIO.PATRICIA.A.1365839030
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=MONTANIO.PATRICIA.A.1365839030
Date: 2015.03.02 11:28:37 -05'00'

Patricia A. Montanio
NOAA NEPA Coordinator

Enclosure

TITLE OF ENVIRONMENTAL REVIEW	Draft Environmental Impact Statement on the Makah Tribe Request to Hunt Gray Whales
RESPONSIBLE AGENCY AND OFFICIAL	William W. Stelle, Jr., Regional Administrator National Marine Fisheries Service (NMFS), West Coast Region 7600 Sand Point Way NE, Building 1 Seattle, WA 98115-0070 (206) 526-6150
COOPERATING AGENCY	U.S. Bureau of Indian Affairs
CONTACT	Steve Stone NMFS Protected Resources Division, West Coast Region 1201 NE Lloyd Blvd., Suite 1100 Portland, OR 97232 Steve.Stone@noaa.gov (Note: not for commenting) (503) 231-2317
LOCATION OF PROPOSED ACTIVITIES	The coastal portion of the Tribe's usual and accustomed fishing grounds (U&A), off the northwest coast of Washington State.
PROPOSED ACTION	The Makah Indian Tribe proposes to resume treaty-based hunting of eastern North Pacific (ENP) gray whales (*Eschrichtius robustus*) for ceremonial and subsistence purposes. The Tribe proposes to harvest up to 24 whales over a 6-year period, with no more than five gray whales harvested in any single year.
ABSTRACT	In February 2005, the Makah Indian Tribe submitted to NMFS a request to resume treaty-based hunting of ENP gray whales in the coastal portion of the Tribe's U&A. The Tribe's request stems from the 1855 Treaty of Neah Bay, which expressly secures the Makah Tribe's right to hunt whales. To exercise that right, the Makah Tribe is seeking authorization from NMFS under the Marine Mammal Protection Act and Whaling Convention Act. This draft environmental impact statement considers various alternatives to the Tribe's proposed action and principal components associated with a hunt, including: hunt timing and location; the number of whales harvested, struck, and struck and lost; cessation of whale hunting if a predetermined number of identified whales were harvested; the method of hunting; and the duration of regulations and permits.

Executive Summary

The action considered in this draft environmental impact statement (DEIS) concerns the Makah Indian Tribe's February 2005 request to resume limited hunting of eastern North Pacific (ENP) gray whales (*Eschrichtius robustus*) in the coastal portion of the Tribe's usual and accustomed fishing grounds (U&A), off the coast of Washington State, for ceremonial and subsistence purposes. The Tribe's proposed action stems from the 1855 Treaty of Neah Bay, which expressly secures the Makah Tribe's right to hunt whales. To exercise that right, the Makah Tribe is seeking authorization from the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) under the Marine Mammal Protection Act (MMPA) and the Whaling Convention Act.

This DEIS, prepared pursuant to the National Environmental Policy Act (42 USC 4321 et seq.), supersedes a previous DEIS issued in 2008 then terminated in 2012 (77 Fed Reg. 29967, May 21, 2012) and considers various alternatives to the Tribe's proposed action. To develop the full range of action alternatives, we, NMFS, considered the principal components associated with a hunt, including: the time when whale hunting would occur; the area where whale hunting would occur; the annual and six-year limits on the number of whales harvested, struck, and struck and lost; cessation of whale hunting if a predetermined number of Pacific Coast Feeding Group (PCFG) whales were harvested; and the method of hunting. The resultant alternatives are:

- **Alternative 1**, the No-action Alternative, would not authorize a Makah gray whale hunt.
- **Alternative 2**, the Tribe's Proposed Action Alternative, would allow harvest of four ENP gray whales per year on average (with a maximum of five in any one year) and up to 24 whales in any 6-year period. Hunting would be allowed in the Tribe's U&A outside the Strait of Juan de Fuca from December 1 to May 31. Hunting would not be allowed within 200 yards of Tatoosh Island and White Rock. The number of whales that could be struck would be limited to no more than seven in any calendar year and no more than 42 over

the 6-year period, while the number of whales struck and lost would be limited to three annually and 18 over the 6-year period. The maximum number of whales struck in any year would be seven, and the maximum number struck and lost would be three. Under the proposed action alternative, in any year the hunt would cease if a calculated number of PCFG whales (based on the potential biological removal (PPR) formula used in NMFS' MMPA stock assessment reports) were landed and identified. Current calculations result in a harvest limit estimate of 3.0 PCFG whales.

- **Alternative 3** would have the same conditions as Alternative 2 regarding numbers of ENP whales struck, struck and lost, and harvested; seasonal restrictions; and regulatory conditions. Alternative 3 would have the same hunt area as Alternative 2, except that it would prohibit Makah hunters from making an initial strike on a gray whale within 5 miles (8 km) of shore, and assumes an all-motorized hunt with no use of a canoe. Alternative 3 would also differ from Alternative 2 in its approach to managing impacts to the PCFG. It would set an annual total mortality limit for PCFG whales equal to the PBR as applied to PCFG whales in NMFS' most recent MMPA stock assessment report. Current calculations result in a mortality limit estimate of 2.7 PCFG whales. This alternative would also have an additional annual mortality limit for female PCFG whales equal to one-half the PBR.

- **Alternative 4** would have the same conditions as Alternative 2 except the hunting season would be from June 1 through November 30, to avoid killing a Western North Pacific (WNP) whale (because such whales would be feeding in the WNP at this time and not present in the Makah U&A). Because hunting would be allowed during the period that defines membership in the PCFG, Alternative 4 would also include restrictions specifically intended to manage impacts to the PCFG. Key restrictions include avoiding female whales, setting an annual total mortality limit using the PBR approach described for Alternative 3 (but using a lower recovery factor and accounting for other sources of human-caused mortality), and the presumption that all whales struck but not landed are PCFG whales. Current calculations result in a mortality limit estimate of 1 PCFG whale.

- **Alternative 5** would have the same conditions as Alternative 2, except there would be two hunting seasons of 3 weeks each: one from December 1 through December 21 and one from May 10 through May 31. This split-season approach is intended to avoid killing a WNP whale and to minimize the chance of killing a PCFG whale. Alternative 5 would also differ from Alternative 2 by setting an annual PCFG mortality limit at 10 percent of PBR. Current calculations result in a mortality limit estimate of 0.27 PCFG whales. This alternative would also count any whale struck but not landed as a PCFG whale in proportion to the observed presence of PCFG whales in the Makah U&A during that season.

- **Alternative 6** would have the same conditions as Alternative 2, except that strikes would be limited to seven over 2 years and an annual PCFG mortality limit would be set using the PBR formula as applied to the PCFG in NMFS' most recent stock assessment report (minus other sources of human-caused mortality). Current calculations result in a mortality limit estimate of 2.25 PCFG whales. Alternative 6 would also differ from Alternative 2 by counting all whales struck but not landed against the PCFG limit based on their proportional presence during the season they were struck and lost. In addition, the waiver of the MMPA take moratorium would expire 10 years after adoption, and regulations governing the hunt would limit the term of any hunt permit to not more than 3 years.

We developed these alternatives and resources for review with input from NMFS staff, the applicant, the Makah Tribe, the cooperating agency (Bureau of Indian Affairs), and comments from the public (77 Fed Reg. 29967, May 21, 2012). The resources identified for review include: water quality, marine habitat and species, gray whales, other wildlife species, economics, environmental justice, social environment, cultural resources, ceremonial and subsistence resources, noise, aesthetics, transportation, public services, public safety, human health, and the national and international regulatory environment. Table ES-1 summarizes the results of our draft analysis, using Alternative 1 (the No-action Alternative) as the baseline for assessing the impacts on the various resources.

This DEIS provides an important opportunity for the public to formally comment on the Tribe's proposal and the various alternatives. We have not identified a preferred alternative in this DEIS. We will address public comments in the final version of the EIS. These comments, in conjunction with considerations described in this DEIS, will provide key information to assist NMFS with its final decision on the Tribe's request.

Table ES-1 – Summary of Impacts from the Action Alternatives Analyzed in this DEIS Relative to the No-Action Alternative. Refer to Section 4 and Table 4-15 for more detailed narrative associated with our analysis of the various alternatives and resources.

Resources	No Action Alternative	Impact and Magnitude Relative to No-action Alternative
Drinking Water Sources	Current risk levels would continue.	None of the action alternatives are likely to increase the risk of adverse impacts on drinking water sources.
Marine Waters	Current risk levels would continue (includes occasional disposal of drift whale carcasses).	All action alternatives are likely to increase the risk of adverse impacts on marine waters. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Pelagic Species and Communities	Current levels of disturbance would continue.	All action alternatives are likely to increase the risk of adverse impacts on pelagic species and communities. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Benthic Species and Communities	Current levels of disturbance would continue.	All action alternatives could increase the risk of adverse impacts on benthic species and communities. Alternative 5 would likely have the least impact.
ENP Gray Whale Stock	Current IWC-set catch limits would continue. ENP gray whale stock is likely to remain at or near carrying capacity.	None of the action alternatives are likely to increase the risk of adverse impacts on the ENP gray whale stock.
WNP Gray Whale Stock	The IWC has not set a catch limit for WNP gray whales.	All action alternatives (except perhaps Alternative 4) are likely to increase the risk of adverse impacts on the WNP gray whale stock. Alternative 2 would have the most risk while Alternative 4 would have the least risk.
PCFG Gray Whales	No hunting would occur in the PCFG seasonal range.	All action alternatives are likely to increase the risk of adverse impacts on PCFG gray whales. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Gray Whales Using the Makah U&A and OR-SVI Areas	No hunting would occur in local survey areas.	All action alternatives are likely to increase the risk of adverse impacts on gray whales using local survey areas. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources	No Action Alternative	Impact and Magnitude Relative to No-action Alternative
Individual Whales	On average, 124 whales could be harvested in the Chukotkan hunt annually, experiencing manner and time to death particular to that hunt. Approximately 3 percent would be struck and lost.	All action alternatives are likely to increase the risk of adverse impacts on individual gray whales. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Marine Mammals	Current levels of disturbance would continue.	All action alternatives could increase the risk of adverse impacts on marine mammals. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Other Marine Wildlife	Current levels of disturbance would continue.	All action alternatives could increase the risk of adverse impacts on other marine wildlife. Alternative 2 would likely have the most impact while Alternative 5 would likely have the least impact.
Tourism	No opportunity for Tribe to promote hunt-related tourism and no likelihood of hunt-related boycott. Potential for small disproportionate effect on Tribe.	All action alternatives are likely to have a mix of beneficial and adverse impacts on tourism. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.
Household Use of Whale Products	Current limited availability of drift whales and whales incidentally caught in fishing operations (potentially one whale every 10 years).	All action alternatives are likely to have beneficial impacts on household use of whale products. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Whale-watching Industry	Current levels of revenues from, and employment in, whale-watching industry would continue.	None of the action alternatives are likely to increase the risk of adverse impacts on the whale-watching industry.
Shipping and Ocean Sport/ Commercial Fishing	Current passage conditions for ships and fishing vessels would continue.	All action alternatives could increase the risk of adverse impacts on shipping and ocean sport/commercial fishing. Alternative 3 would likely have the most impact, while Alternative 5 would likely have the least impact.
Management and Law Enforcement	No change from current conditions.	All action alternatives are likely to increase the risk of adverse impacts on management and law enforcement. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Economics	Current levels of tourism would continue. Current occasional household use of products from drift whales and whales incidentally caught in fishing operations (potentially one whale every 10 years).	All action alternatives are likely to have a mix of beneficial and adverse impacts on economics. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.

Resources	No Action Alternative	Impact and Magnitude Relative to No-action Alternative
Ceremonial and Subsistence Resources	Current limited availability of drift whales and whales incidentally caught in fishing operations (potentially one whale every 10 years). Lack of access to resource has disproportionate impact on Tribe.	All action alternatives are likely to have beneficial impacts on ceremonial and subsistence resources. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Social Environment	Potential for tension between Makah Tribe and others, including federal government.	All action alternatives are likely to have a mix of beneficial and adverse impacts on the social environment. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.
Makah Tribal Members, Other Tribes, and Other Individuals and Organizations	Likely no protests and related social tensions. No change from current level of tension between members opposed to the hunt and those supporting it. The latter may feel continued frustration with U.S. government.	All action alternatives are likely to have a mix of beneficial and adverse impacts on Makah tribal members, other tribes, and other individuals and organizations. Alternative 2 would have the greatest likelihood of mixed impacts while Alternative 5 would have the least.
Sites with Cultural Significance	No change from current conditions.	All action alternatives are likely to have a mix of beneficial and adverse impacts on sites with cultural significance. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.
Access to Whale Hunting Opportunities	No change from current conditions, i.e., no access to whale hunting opportunities.	All action alternatives are likely to have beneficial impacts on access to whale hunting opportunities. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Subsistence Use	The Tribe could pursue some subsistence uses of whales (such as using drift whales or whales incidentally caught in fishing operations), but they would have limited cultural value if not practiced in connection with actual whale hunts.	All action alternatives are likely to have beneficial impacts on subsistence use of whale products. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Traditional Knowledge and Activities	The Tribe could continue to engage in many related activities, and could apply and transmit relevant knowledge, but this would have limited cultural value if not practiced in connection with actual whale hunts. Application and transfer of knowledge related to actual hunting would be limited to discussions of past whale hunting.	All action alternatives are likely to have beneficial impacts on traditional knowledge and activities. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources	No Action Alternative	Impact and Magnitude Relative to No-action Alternative
Spiritual Connection to Whaling	Spiritual connection to whaling would continue to be limited to connection to past whaling and spiritual connection may eventually wane.	All action alternatives are likely to have beneficial impacts on the Tribe’s spiritual connection to whaling.
Cultural Identity	Tribal identity could erode in the absence of opportunities to participate in an activity central to Makah cultural identity.	All action alternatives are likely to have beneficial impacts on the Tribe’s cultural identity.
Noise Levels at Receiving Properties	No change from current conditions.	All action alternatives are likely to increase the risk of adverse impacts on noise levels at receiving properties. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
On-scene Observers	Current lack of opportunity to view an authorized whale hunt would continue.	All action alternatives are likely to have a mix of beneficial and adverse impacts on on-scene observers. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.
Media Observers	Current lack of opportunity to view an authorized whale hunt would continue.	All action alternatives are likely to have a mix of beneficial and adverse impacts on media observers. Alternative 2 would have the greatest likelihood of mixed impacts while Alternative 5 would have the least.
Highway, Marine, and Air Traffic	No change from current conditions.	All action alternatives are likely to increase the risk of adverse impacts on highway, marine, and air traffic. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Law Enforcement and Medical Facilities	No change from current conditions.	All action alternatives could increase the risk of adverse impacts on law enforcement and medical facilities. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
Injury from Weapons, Boating Accidents, and Land-based Protest Activities	No change from current conditions.	All action alternatives are likely to increase the risk of adverse impacts because of injury from weapons, boating accidents, and land-based protest activities. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources	No Action Alternative	Impact and Magnitude Relative to No-action Alternative
Nutritional Benefits, Environmental Contaminants, and Exposure to Food-borne Pathogens	No change from current conditions.	All action alternatives are likely to have a mix of beneficial and adverse impacts associated with nutritional benefits, environmental contaminants, and exposure to food-borne pathogens. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.
Marine Mammals Nationally	It is uncertain, but possible, that a decision not to authorize a Makah whale hunt could discourage future requests for a waiver of the MMPA.	It is uncertain what, if any, impacts the action alternatives are likely to have on the national regulatory environment for marine mammals.
Worldwide Whaling	A U.S. decision not to authorize a Makah whale hunt is unlikely to influence the position of the United States or other countries regarding IWC issues.	It is uncertain what, if any, impacts the action alternatives are likely to have on worldwide whaling.

Acronyms and Abbreviations

ABL	allowable bycatch level
AEWC	Alaska Eskimo Whaling Commission
APL	Allowable Pacific Coast Feeding Group Limit
AWMP	Aboriginal Whaling Management Procedure
BIA	Bureau of Indian Affairs
C	Celsius
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cm	centimeters
CZMA	Coastal Zone Management Act
dB	decibel
DDT	dichloro-diphenyl-trichloroethane
DEIS	Draft Environmental Impact Statement
DNA	deoxyribonucleic acid
DPS	distinct population segment
dw	dry weight
EA	Environmental Assessment
Ecology	Washington Department of Ecology
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
ENP	eastern North Pacific
EPA	[U.S.] Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FONSI	Finding of No Significant Impact
FR	Federal Register
g	gram
GAMMS	Guidelines for Assessing Marine Mammal Stocks
Hz	hertz

ICRW	International Convention for the Regulation of Whaling
IU	international units
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
JS1	Jolly-Seber model 1
K	carrying capacity
kg	kilogram
km	kilometer
Makah or Tribe	Makah Indian Tribe
MEZ	Moving Exclusionary Zone
mg	milligram
mi	mile
ml	milliliter
MMC	Marine Mammal Commission
MMPA	Marine Mammal Protection Act
MNPL	maximum net productivity level
MSA	Magnuson-Stevens Act
MSY	maximum sustainable yield
MSYL	maximum sustainable yield level
MSYR	maximum sustainable yield rate
mtDNA	mitochondrial DNA
NBC	northern British Columbia
NCA	northern California
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NMML	National Marine Mammal Laboratory
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NWA	northern Washington Coast survey area
NWA-SJF	northern Washington Coast through Strait of Juan de Fuca
OCNMS	Olympic Coast National Marine Sanctuary
OR-SVI	Oregon through Southern Vancouver Island
OSP	optimum sustainable population
PBR	potential biological removal
PCBs	polychlorinated biphenyls

PCDD	polychlorinated dibenzodioxin
PCDF	polychlorinated dibenzofuran
PCFA	Pacific Coast Feeding Aggregation survey area
PCFG	Pacific Coast Feeding Group
PFMC	Pacific Fishery Management Council
pH	potential of hydrogen (acidity or alkalinity)
PL	public law
RCW	Revised Code of Washington
RNA	Regulated Navigation Area
ROD	Record of Decision
Sanctuary	Olympic Coast National Marine Sanctuary
SAR	stock assessment report
SLA	strike limit algorithm
SJF	Strait of Juan de Fuca
SVI	southern Vancouver Island
SWG	Standing Working Group
TCDD	tetrachlorodibenzodioxin
TCDF	tetrachlorodibenzofuran
Treaty	1855 Treaty of Neah Bay
U&A	usual and accustomed fishing grounds
U.S.C.	United States Code
µg	microgram
UNESCO	United Nations Educational, Scientific, and Cultural Organization
USC	United States Code
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WCA	Whaling Convention Act
WDFW	Washington Department of Fish and Wildlife
WNP	western North Pacific
ww	wet weight

Glossary

.50 and .577 caliber rifle = High-powered rifles designed to shoot a bullet of diameter 0.5 inches or 0.577 inches, respectively.

Aboriginal subsistence whaling = As defined in regulations implementing the Whaling Convention Act, aboriginal subsistence whaling refers to whaling authorized by paragraph 13 of the Schedule annexed to and constituting a part of the Convention (i.e., International Convention for the Regulation of Whaling). The Schedule does not otherwise define aboriginal subsistence whaling, but the International Whaling Commission adopted the following definition of subsistence use by consensus at its 2004 annual meeting: (1) The personal consumption of whale products for food, fuel, shelter, clothing, tools, or transportation by participants in the whale harvest; (2) The barter, trade, or sharing of whale products in their harvested form with relatives of the participants in the harvest, with others in the local community or with persons in locations other than the local community with whom local residents share familial, social, cultural, or economic ties. A generalized currency is involved in this barter and tra[d]e, but the predominant portion of the products from each whale are ordinarily directly consumed or utilized in their harvested form within the local community; (3) The making and selling of handicraft articles from whale products, when the whale is harvested for the purposes defined in (1) and (2) above. General principles governing aboriginal subsistence whaling are contained in the Schedule.

Aboriginal subsistence whaling quota = Number of whales that may be taken by a Native American whaling organization for subsistence uses.

Adaptive management plan = A management approach wherein a plan is changed and improved in response to lessons learned during plan implementation.

Alaska Eskimos/Alaska Natives = A group of native people living in the Arctic coastal regions of Alaska.

Algal bloom = A rapid and often visible increase in the population of (usually) phytoplankton algae in an aquatic system.

Allowable Bycatch Level (ABL) = As defined in the Makah Tribe's waiver request, the number of whales from the Pacific Coast Feeding Group (PCFG) that may be taken incidental to a hunt directed at the migratory portion of the Eastern North Pacific stock of gray whales. The ABL is calculated using the Marine Mammal Protection Act's potential biological removal approach but the minimum population estimate is calculated from the number of previously seen whales in the Oregon-Southern Vancouver Island survey area.

Ancestral villages = A settlement that has been inhabited for many generations.

Ancient canoe runs = Sub- and inter-tidal areas where it is possible to see old pathways perpendicular to the shoreline that were cleared of boulders and cobbles to allow canoes to reach shore without being damaged.

Baleen whale = A whale of the Suborder Mysteceti whose members have comb-like baleen plates (instead of teeth) which enable them to filter food from the water. As defined by the July 2012 Schedule to the International Convention for the Regulation of Whaling, baleen whale means any whale which has baleen or whale bone in the mouth (i.e. any whale other than a toothed whale).

Benthic = Living on the bottom of the ocean.

Benthos = The collection of organisms living on the bottom of the ocean.

Bequians = Inhabitants of Bequia, the second largest of the thirty-two islands and cays that make up the island state of St. Vincent & the Grenadines.

Bilateral agreement = An agreement between two countries detailing their mutual understanding, policies, and obligations on a particular matter.

Bunker fuel = A common and often low grade fuel used to power cargo ships.

Bureau of Indian Affairs = A United States agency within the Department of the Interior charged with the administration and management of land held in trust by the United States for American Indians, Indian tribes and Alaska Natives. In addition, the Bureau of Indian Affairs provides education services to approximately 48,000 Indians.

Calf (whale) = As defined by regulations implementing the Whaling Convention Act, a calf is any whale less than 1-year old or having milk in its stomach.

Cervical and cranial thoracic regions = Relating to the neck (cervical) or skull (cranial) in the chest (thoracic) region of a whale.

Cetacean = Refers to an animal belonging to the order Cetacea, which includes sea mammals such as whales and dolphins.

Chase boat = According to the Makah waiver application, a powered boat that assists in the whale hunt by staying in close proximity to the whaling crew in the canoe and towing a harvested whale to shore. In the Makah proposal each chase boat would be manned by a pilot, diver, rifleman, backup harpooner, and at least one other crew member, and would be equipped with a navigation system capable of fixing the vessel's position on the water.

Chukotka natives = Aboriginal people located in the far northeast of the Russian Federation.

Coastal Zone Management Act (CZMA) = A United States law that regulates development in coastal areas.

Code of Federal Regulations (CFR) = The United States government's codification of the general and permanent rules and regulations (sometimes called administrative law) published in the Federal Register by the executive departments and agencies of the United States Federal Government. The CFR is published by the Office of the Federal Register, an agency of the National Archives and Records Administration.

Contracting Government = A country/government party to the International Convention for the Regulation of Whaling.

Cooperative agreement = As defined by regulations implementing the Whaling Convention Act, a cooperative agreement is a written agreement between the National Oceanic and Atmospheric Administration and a Native American whaling organization for the cooperative management of aboriginal subsistence whaling operations.

Council on Environmental Quality (CEQ) = A division of the White House established as part of the National Environmental Policy Act of 1969. The CEQ issues an annual report to the President of the United States on the state of the environment; coordinates United States environmental efforts and works closely with agencies and other White House offices in the development of environmental and energy policies and initiatives; oversees federal agency implementation of the environmental impact assessment process; and acts as a referee when agencies disagree over the adequacy of such assessments.

Cultural Anthropology Panel = A group of experts in cultural anthropology convened by the International Whaling Commission in 1979 to discuss the Alaska Eskimo bowhead hunts.

Darting gun = A hand thrown device consisting of a barrel (to hold an explosive projectile) that is attached to a wooden shaft equipped with a toggle-point harpoon. The barrel contains a trigger rod that ignites a propellant or 'pusher' charge which fires the explosive projectile into the whale's body.

Decibels = A unit of measurement for sounds, in particular the loudness of sounds.

Delegates = Members of delegations, headed by commissioners, representing member nations that are party to the International Whaling Commission.

Deoxyribonucleic acid (DNA) = A large, double-stranded, helical molecule found in the nucleus of cells that carries the genetic code for an organism.

Dispatch = To kill a whale with a rifle or penthrite grenade.

Diver = According to the Makah waiver application, a member of the whaling crew whose duties include diving into the water from the chase boat to attempt to sew a whale's mouth shut to prevent the whale from sinking after it has been struck by the harpooner and shot by the rifleman.

Drift whale = A whale that dies naturally or as a result of some human activity other than a directed hunt (for example, entanglement in fishing gear).

Eastern North Pacific (ENP) gray whales = Gray whales that feed during the summer and fall primarily in the Chukchi, Beaufort, and northwestern Bering Seas, but also as far south as California.

Ecotourism = Tourism that focuses on the natural ecological attributes of an area (e.g., whale-watching) and their preservation.

Ecotype = A subgroup of a species that is differentiated from other subgroups by distinct adaptations to a particular habitat.

Eight-gauge shoulder gun = A shoulder-mounted firearm with a long, smooth-bore barrel capable of shooting a 0.835-inch projectile.

Endangered species = As defined in the Endangered Species Act, an endangered species means any species which is in danger of extinction throughout all or a significant portion of its range.

Endangered Species Act (ESA) = A United States law that provides for the conservation of endangered and threatened species of fish, wildlife, and plants.

Endangered species list = The List of Endangered and Threatened Wildlife (50 CFR 17.11), and the List of Endangered and Threatened Plants (50 CFR 17.12) name all species of mammals, birds, reptiles, amphibians, fishes, insects, plants, and other creatures that have been determined by the National Marie Fisheries Service or the United States Fish and Wildlife Service to be in the greatest need of Federal protection. Once listed, a species receives the full range of protections available under the Endangered Species Act, including prohibitions on killing, harming or otherwise taking a species.

Environmental Assessment (EA) = In the context of National Environmental Policy Act, an EA is a concise public document that analyzes the environmental impacts of a proposed Federal action and provides sufficient evidence to determine the level of significance of the impacts. The EA includes a brief analysis of the environmental impacts of the proposed action and its alternatives, and results in one of two determinations: (1) an Environmental Impact Statement is required; or (2) a Finding of No Significant Impact.

Environmental Impact Statement (EIS) = A detailed written statement required by the National Environmental Policy Act and prepared by a federal agency. The EIS is used by decisionmakers to take environmental consequences into account. It describes a proposed action, the need for the action, alternatives considered, the affected environment, the environmental impacts of the proposed action, and other reasonable alternatives to the proposed action. An EIS is prepared in two stages: a draft and a final.

Environmental Protection Agency (EPA) = A United States agency responsible for protecting human health and the environment.

Eskimos = See Alaska Eskimos.

Evolutionarily significant unit (ESU) = A concept the National Marine Fisheries Service uses to identify distinct population segments of Pacific salmon under the Endangered Species Act. An ESU is a population or group of populations of Pacific salmon that (1) is substantially reproductively isolated from other populations and (2) contributes substantially to the evolutionary legacy of the biological species.

Exclusive economic zone (EEZ) = A coastal zone under national jurisdiction (up to 200-nautical miles wide) declared under the provisions of the 1982 United Nations Convention of the Law of the Sea, within which the United States has the rights over the use and exploration of marine resources. The United States EEZ in the northern portion of the Makah Usual and

Accustomed fishing grounds is much narrower than 200 nautical miles due to the international boundary with Canada.

Federal Register = The United States government's daily publication of federal agency regulations and documents, including presidential proclamations, executive orders, and documents that must be published per acts of Congress.

Finding of No Significant Impact (FONSI) = A short National Environmental Policy Act document that presents the reasons why an action will not have a significant impact on the quality of the human environment and, therefore, will not require preparation of an Environmental Impact Statement. A Finding of No Significant Impact must be supported by the Environmental Assessment.

First Nation = A term referring to the aboriginal people located in what is now Canada.

Flense = To strip the blubber or skin from a dead whale.

Floats = Air-filled buoys attached by ropes to a struck or dead whale using a harpoon with a toggle point head. The floats keep the whale on the water surface so that it can be towed to shore for butchering.

Harassment = As defined in regulations implementing the Marine Mammal Protection Act, harassment means any act of pursuit, torment, or annoyance which: (1) has the potential to injure a marine mammal or marine mammal stock in the wild; or (2) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. In the case of a military readiness activity or a scientific research activity conducted by or on behalf of the Federal Government, the term harassment means (1) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild; or (2) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered.

Harpooner = According to the Makah waiver application, a member of the whaling crew whose duties include throwing a long spear-like harpoon at a whale in order to embed a steel barb and its accompanying line and floats into the animal. A backup harpooner accompanies a separate crew on the tribal chase boat.

Harvest = To kill and land a whale.

Haulout = A site where seals, sea lions, and other marine mammals climb out of the water to rest on land.

Hertz = A measurement of vibration or frequency expressed in cycles per second. One hertz equals one cycle per second.

Humane = As defined in regulations implementing the Marine Mammal Protection Act, the term humane refers to that method of taking which involves the least possible degree of pain and suffering practicable to the mammal involved.

Identified whale = An individual gray whale that has been identified from photographs and cataloged using a code unique to that animal.

Indian Civil Rights Act = A United States law that prohibits Indian tribal governments from enacting or enforcing laws that violate certain individual rights. It was adopted by the United States Congress to ensure that tribal governments respect basic rights of Indians and non-Indians.

International Convention for the Regulation of Whaling (ICRW) = An international treaty (also referred to as the "Convention") signed in 1946 designed to "provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry." A focus of the treaty was the establishment of the International Whaling Commission. There are presently 79 member nations to the ICRW, including the United States.

International Whaling Commission (IWC) = A body of commissioners charged with carrying out the provisions of the ICRW.

IWC aboriginal subsistence whaling = See Aboriginal subsistence whaling

IWC Commercial Whaling Moratorium = A moratorium on all commercial whaling approved by the International Whaling Commission in 1982 which effectively expanded the 1937 ban on commercial harvest of gray whales and right whales to all large whale species.

IWC Scientific Committee = A part of the International Whaling Commission (IWC), this group consists of approximately 200 of the world's leading whale biologists who provide advice on the status of whale stocks. The IWC Scientific Committee meets annually in the two weeks immediately preceding the main International Whaling Commission meeting. It may also call special meetings as needed to address particular subjects during the year.

Land/Landing = As defined by regulations implementing the Whaling Convention Act, landing means bringing a whale or any parts thereof onto the ice or land in the course of whaling operations.

Landfill = A place where solid waste (garbage) is disposed between layers of dirt.

Level A harassment = As defined in regulations implementing the Marine Mammal Protection Act, Level A harassment means any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild. In the case of a military readiness activity or a scientific research activity conducted by or on behalf of the Federal Government, the term Level A harassment means any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild.

Level B harassment = As defined in regulations implementing the Marine Mammal Protection Act, Level B harassment means any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. In the case of a military readiness activity or a scientific research activity conducted by or on behalf of the Federal Government, the term Level B harassment means any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered.

Local aboriginal consumption = A phrase defined by the 1981 *Ad Hoc* Technical Working Group (but not formally adopted by the International Whaling Commission) to mean traditional uses of whale products by local aboriginal, indigenous or native communities in meeting their nutritional, subsistence and cultural requirements. The term includes trade in items which are by-products of subsistence catches.

Lose = As defined by the July 2012 Schedule to the International Convention for the Regulation of Whaling, lose means to either strike or take but not to land. (‘Take’ has a distinct meaning in the Marine Mammal Protection Act and International Convention for the Regulation of Whaling.)

Maa-Nulth First Nations = The Maa-nulth First Nations comprise five First Nations from Vancouver Island. They include: Huu-ay-aht First Nations, Ka:’yu:’k’t’h’/Che:k’tles7et’h First Nations, Toquaht Nation, Uchucklesaht Tribe, and the Ucluelet First Nation. Maa-nulth means “villages along the coast” in the Nuu-chah-nulth language. These villages/territories are located on the west coast of Vancouver Island surrounding Barkley Sound and Kyuquot Sound.

Makah Tribal Council = The governing body of the Makah Tribe. In three cooperative agreements with the Makah Tribe (in 1996, 1997, and 2001) the National Oceanic and Atmospheric Administration recognized the Makah Tribal Council as a Native American whaling organization and allowed the Council to issue permits to whaling captains in compliance with the cooperative agreements and Whaling Convention Act regulations.

Makah Whaling Commission = Members of the Makah Tribe that serve to review whaling crew qualifications, identify whaling crew and vessel participation, and provide other hunt restrictions and recommendations. The Makah Tribal Council would issue the permit to a whaling captain before any hunt, based on recommendations from the Makah Whaling Commission.

Maktak = Whale skin and layer of blubber used for food.

Magnuson Stevens Act (MSA) = Also known as the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006. A United States law that is the governing authority for all fishery management activities that occur in federal waters within the United States 200 nautical mile limit, or Exclusive Economic Zone. The recent reauthorization mandates the use of annual catch limits and accountability measures to end overfishing, provides for widespread market-based fishery management through limited access programs, and calls for increased international cooperation.

Marine Mammal Commission (MMC) = An independent agency of the United States Government, established under Title II of the Marine Mammal Protection Act. The MMC was created to provide independent oversight of the marine mammal conservation policies and programs being carried out by the federal regulatory agencies. The MMC is charged with developing, reviewing, and making recommendations on domestic and international actions and policies of all federal agencies with respect to marine mammal protection and conservation and with carrying out a research program.

Marine Mammal Protection Act (MMPA) = A United States law that prohibits, with certain exceptions, the take of marine mammals in United States waters and by United States citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States

Maximum Net Productivity Level (MNPL) = A population level related to maximum net productivity, a rate of change defined in the National Marine Fisheries Service's Marine Mammal Protection Act regulations as the greatest net annual increment in population numbers or biomass resulting from additions to the population due to reproduction and/or growth less losses due to natural mortality.

Mitochondrial deoxyribonucleic acid (mtDNA) = DNA that is found in the mitochondria of cells. Unlike nuclear DNA, mtDNA is only inherited through the mother.

Moratorium = See IWC Commercial Whaling Moratorium

Moving Exclusion Zone (MEZ) = As defined in United States Coast Guard regulations, the MEZ is a vessel-based buffer within the Regulated Navigation Area designed to promote the safety of the whaling crew and other persons/watercraft operating in the vicinity of the whaling crew. The MEZ includes the column of water from the surface to the seabed with a radius of 500 yards centered on the Makah whale hunt vessel. Unless otherwise authorized by the Coast Guard, no person or vessel may enter the active MEZ except for an authorized Makah whale hunt and certain authorized media pool vessels.

Muzzle break = A device fitted to the end of the barrel that reduces gun recoil by re-directing gases that propel the bullet.

National Environmental Policy Act (NEPA) = A United States law declaring that it is the continuing policy of the Federal government to use all practicable means to create and maintain conditions under which people and nature can exist in productive harmony and fulfill the social, economic, and other needs of present and future generations of Americans. NEPA provides a mandate and a framework for Federal agencies to consider all reasonably foreseeable environmental effects of their proposed actions and to involve and inform the public in the decisionmaking process.

National Marine Fisheries Service (NMFS) = A United States agency within the National Oceanic and Atmospheric Administration and under the Department of Commerce charged with the stewardship of living marine resources through science-based conservation and management, and the promotion of healthy ecosystems.

National Oceanic and Atmospheric Administration (NOAA) = A scientific agency of the United States Department of Commerce focused on the conditions of the oceans and the atmosphere. NOAA warns of dangerous weather, charts seas and skies, guides the use and protection of ocean and coastal resources, and conducts research to improve understanding and stewardship of the environment. NOAA manages 13 National Marine Sanctuaries, including the Olympic Coast National Marine Sanctuary.

NOAA Office of International Affairs = An office within the National Oceanic and Atmospheric Administration that develops, coordinates, and promotes United States international policies in NOAA-related matters such as ecosystem-based management, climate change, earth observation, and weather forecasting.

Native American whaling organization = As defined by Whaling Convention Act regulations, an entity recognized by NMFS (e.g., the Makah Tribe) as representing and governing the relevant Native American whalers for the purposes of cooperative management of aboriginal subsistence whaling.

Non-binding resolution = A written motion adopted by a deliberative body (e.g., the United States Congress) that does not progress into a law but instead serves to formally express an opinion.

Observer = According to the Makah waiver application, a member of the Makah Department of Fisheries Management whose duties include observing the hunt and photographing any whale landed.

Occipital condyle = Skull bones located at the back and lower part of the cranium near the attachment of the spinal column.

Olympic Coast National Marine Sanctuary (OCNMS) = One of 13 marine sanctuaries in the United States administered by NOAA. It was designated as the first National Marine Sanctuary in the Pacific Northwest in 1994 and encompasses 3,310 square miles off of Washington State's Olympic Peninsula, extending 135 miles along the Washington Coast from about Cape Flattery to the mouth of the Copalis River.

Olympic National Park = A large national park located on Washington’s Olympic Peninsula and managed by the United States National Park Service. Originally designated as the Olympic National Monument in 1909, it was re-designated a National Park in 1938 and became a World Heritage Site in 1981.

Optimum sustainable population (OSP) = As defined by regulations implementing the Marine Mammal Protection Act, the term optimum sustainable population means, with respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element.

Oregon to Southern Vancouver Island (OR-SVI) = An area surveyed for whales within the Pacific Coast Feeding Group range and encompassing coastal marine waters from Oregon to southern Vancouver Island, B.C.

Oregon to Southern Vancouver Island (OR-SVI) whales = PCFG whales observed in any survey area from southern Oregon to southern Vancouver Island (excluding areas in Puget Sound).

Pacific Coast Feeding Group (PCFG) range = A coastal marine area from northern California to northern Vancouver Island, B.C, used by PCFG gray whales.

Pacific Coast Feeding Group (PCFG) whales = Gray whales observed in at least 2 years between June 1 and November 30 in the PCFG area (along the U.S. and Canada coasts between 41°N and 52°N, excluding areas in Puget Sound) and entered into the Cascadia Research Collective's photo-identification catalog. For purposes of determining whether a harvested whale is a PCFG whale (i.e., counts against a bycatch or mortality limit), the Tribe's proposal under Alternative 2 would include cataloged whales seen in at least 1 year, while the other action alternatives would include cataloged whales seen in 2 or more years or at least once in the past 4 years.

Pacific Coast Feeding Group (PCFG) Mortality Limit = Term used in this DEIS to refer to calculated limits on all hunt-related mortality (i.e., whales that are struck and lost as well as whales that are landed) of Pacific Coast Feeding Group (PCFG) whales.

Pacific Fishery Management Council (PFMC) = One of eight regional fishery management councils established by the Magnuson Fishery Conservation and Management Act of 1976 for the purpose of managing fisheries from 3-200 miles offshore of the United States of America coastline. The PFMC is responsible for fisheries off the coasts of California, Oregon, and Washington.

Panmixia = The random mating of individuals within a population.

Pelagic = Of or in the upper layers of the open ocean.

Penthrite = Pentaerythritol tetranitrate or PETN. An odorless white crystalline solid used as a powerful explosive. Employed in whale hunting as a "penthrite grenade" discharged from a harpoon cannon.

Petroglyph = An ancient picture or inscription drawn or carved into a rock.

Pilot = According to the Makah waiver application, a member of the whaling crew whose duties include navigating the chase boat.

Plenary session = That portion of the annual International Whaling Commission meeting during which the full body of commissioners (or their deputy/alternate) debate and vote on proposals, resolutions, and motions before the International Whaling Commission.

Plenary power = Complete and unlimited power.

Pods = Small groups of marine mammals, especially whales.

Polychlorinated biphenyls (PCBs) = A class of toxic organic compounds known to accumulate in animal tissue. PCBs were primarily used as cooling and insulating fluids for industrial transformers and capacitors prior to being banned in the United States in the 1970s.

Potential Biological Removal Level (PBR) = As defined by regulations implementing the Marine Mammal Protection Act, the term PBR level means the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population level. The PBR level is the product of the following factors: (1) The minimum population estimate of the stock; (2) One-half the maximum theoretical or estimated net productivity rate of the stock at a small population size; (3) A recovery factor of between 0.1 and 1.0.

Potlatch = A ceremonial gathering and gift-giving feast practiced by the Makah and other tribes of the Pacific Northwest that helps establish important proprietary rights regarding ownership of dances, songs, and other ceremonial and economic privileges.

Precedential effects = The effects of an action that would set a precedent for similar actions in the future.

Pupping = To give birth to pup seals or sea lions.

Record of Decision (ROD) = A National Environmental Policy Act document signed by the agency decisionmaker following the completion of an EIS. The ROD contains the decisions, alternatives considered, environmentally preferable alternative(s), factors considered in the agency's decisions, mitigation measures to be implemented; it also indicates whether all practicable means to avoid or minimize environmental harm have been adopted.

Recruitment = The process of adding individual whales to a population, group or area (usually by reproduction but also by migration).

Regulated navigation area (RNA) = As defined in United States Coast Guard regulations, the RNA is a marine zone the United States Coast Guard established within which the Makah whaling crew can activate a MEZ. The RNA promotes the safety of the whaling crew and other persons/watercraft operating in the vicinity of the whaling crew.

Regional Administrator = A National Marine Fisheries Service official who, among other duties, has been delegated authority to make the initial waiver determination under the Marine Mammal Protection Act on the Makah application.

Rifleman = According to the Makah waiver application, a member of the whaling crew whose duties include shooting a harpooned whale using a high-powered rifle.

Rookeries = Sites where seals and sea lions congregate on shore to mate and give birth.

Russian Federation = A federation of independent states in northeastern Europe and northern Asia; formerly the Soviet Union.

Safety officer = According to the Makah waiver application, a member of the whaling crew whose duties include determining when the rifleman or whaler can discharge their weapon.

Salvage = To collect and utilize a dead, unclaimed whale.

Schedule = A document maintained by the International Whaling Convention that governs the conduct of whaling throughout the world. The measures described in the Schedule, among other things, provide for the protection of certain species; designate specified areas as whale sanctuaries in which commercial whaling may not occur if it were to resume; set limits on the numbers and size of whales which may be taken; prescribe open and closed seasons and areas for whaling; and prohibit the capture of suckling calves and female whales accompanied by calves. The compilation of catch reports and other statistical and biological records is also required. The most recent Schedule was amended by the Commission at the 64th Annual Meeting in Panama City, Panama, July 2012.

Scoping = An open process agencies must conduct under the National Environmental Policy Act to determine the range and significance of the issues to be analyzed in depth in an Environmental Impact Statement.

Seabird breeding colonies = Sites at which seabirds congregate to breed (e.g., the numerous islands, rocks, and cliffs along the Washington coast).

Shoaling = Shallowing

Shrapnel = Fragments from an exploded projectile such as a bullet or bomb.

Stinker = As defined by regulations implementing the Whaling Convention Act, stinker refers to a dead, unclaimed whale found upon a beach, stranded in shallow water, or floating at sea.

Stinky whale = Whales that have a strong chemical smell and claimed to be inedible.

Stock = As defined by regulations implementing the Marine Mammal Protection Act, the term stock (or population stock) means a group of marine mammals of the same species or smaller taxa in a common spatial arrangement, that interbreed when mature.

Strike/Struck = As defined by the July 2012 Schedule to the International Convention for the Regulation of Whaling, strike means to penetrate with a weapon used for whaling.

Subsistence catches = A phrase defined by the 1981 *Ad Hoc* Technical Working Group (but not formally adopted by the International Whaling Convention) to mean catches of whales by aboriginal subsistence whaling operations.

Take = As defined by the July 2012 Schedule to the International Convention for the Regulation of Whaling, take means to flag, buoy or make fast to a whale catcher. As defined by the Marine Mammal Protection Act, take means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

Thermocline = The depth where water temperature changes relatively rapidly and separates less dense, warmer waters from denser, colder waters.

Threatened species = As defined in the Endangered Species Act, a threatened species means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Toggle point = A specialized metal point that helps keep a harpoon from slipping out of a struck whale by means of a metal barb that actuates upon penetrating the whale's skin.

Transfer station = A site used to temporarily store refuse prior to transporting it to the end point of disposal or treatment (e.g., a landfill).

Treaty of Neah Bay = The United States government and the Makah Tribe entered into the Treaty of Neah Bay on January 31, 1855. In addition to reserving the right of taking fish at all usual and accustomed grounds and stations, Article IV of the treaty secured the rights of whaling or sealing. The Treaty of Neah Bay is the only treaty between the United States and an Indian tribe that expressly provides for the right to hunt whales.

United States Coast Guard (USCG) = A branch of the United States Department of Homeland Security involved in maritime law, mariner assistance, and search and rescue in America's coasts, ports, and inland waterways as well as international waters with security and economic interests to the United States.

United States Fish and Wildlife Service (FWS) = A bureau within the United States Department of the Interior responsible for enforcing federal wildlife laws, protecting threatened and endangered species, managing migratory birds, restoring nationally significant fisheries, conserving and restoring wildlife habitat such as wetlands, and helping foreign governments with their international conservation efforts. The FWS manages 520 National Wildlife Refuges, including the Washington Islands National Wildlife Refuges.

Usual and accustomed fishing grounds (U&A) = Areas in Washington where tribes have secured treaty rights to fish. The 1855 Treaty of Neah Bay secured these rights (including whaling and sealing rights) for the Makah tribe, and the tribe's U&A fishing grounds were adjudicated in *United States v. Washington*, 626 F.Supp. 1405, 1467 (W.D. Wash. 1985). The boundaries of this U&A include United States waters in the western Strait of Juan de Fuca as well as open ocean areas of the Washington coast north of 48° 02'15" latitude and east of 125° 44'00" longitude.

Washington Islands National Wildlife Refuges = A complex of three National Wildlife Refuges (Flattery Rocks, Quillayute Needles, and Copalis) spanning over 100 miles of Washington's Pacific Coast. Refuge habitat consists of approximately 870 coastal rocks and reefs managed by the United States Fish and Wildlife Service primarily to protect seabird nesting.

Wasteful manner = As defined by NMFS regulations at 50 CFR 216.3: "[A]ny taking or method of taking which is likely to result in the killing of marine mammals beyond those needed for subsistence, subsistence uses, or for the making of authentic native articles of handicrafts and clothing, or which results in the waste of a substantial portion of the marine mammal and includes, without limitation, the employment of a method of taking which is not likely to assure the capture or killing of a marine mammal, or which is not immediately followed by a reasonable effort to retrieve the marine mammal."

Western North Pacific (WNP) gray whales = Gray whales that feed during the summer and fall in the Okhotsk Sea (primarily off northeast Sakhalin Island, Russia), some of which also feed off southeastern Kamchatka in the Bering Sea.

Whale catcher = As defined by the Whaling Convention Act, a whale catcher is a vessel used for the purpose of hunting, killing, taking, towing, holding onto, or scouting for whales. The Makah tribe proposes to employ two types of whale catchers – a paddle-powered canoe(s) and a motorized chase boat.

Whaling captain = As defined by regulations implementing the Whaling Convention Act, a whaling captain or captain means any Native American who is authorized by a Native American whaling organization to be in charge of a vessel and whaling crew.

Whaling Convention Act (WCA) = A United States law that provides the framework for meeting United States obligations arising from the 1946 International Convention for the Regulation of Whaling. It provides for a United States Commissioner to the International Whaling Commission and authorizes the Secretary of State to present objections to that Commission's regulations. It establishes as unlawful whaling, transporting whales or selling whales, in violation of the Convention regulations. It sets up a whaling licensing framework, with fines and imprisonment for violations. Enforcement is primarily the responsibility of the Secretary of Commerce.

Whaling crew = As defined by regulations implementing the Whaling Convention Act, a whaling crew means those Native Americans under the control of a captain. A Makah whaling crew consists of eight Makah tribal members; one serving as captain and the rest as a harpooner and paddlers.

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Section 1

Purpose and Need

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1.0 PURPOSE AND NEED

1.1 Introduction

1.1.1 Summary of the Proposed Action

The Makah Indian Tribe (Makah or Tribe) proposes to resume limited hunting of eastern North Pacific (ENP) gray whales (*Eschrichtius robustus*) in the coastal portion of the Tribe's usual and accustomed fishing grounds ("U&A"), off the coast of Washington State, for ceremonial and subsistence purposes. The Tribe proposes to harvest up to 20 whales over a 5-year period, with no more than five gray whales harvested in any single year. The Tribe's proposal also includes measures intended to limit the number of harpoon strikes in any year, avoid the intentional harvest of gray whales identified as part of the Pacific Coast Feeding Group (PCFG[1]), limit the annual harvest of PCFG whales based on the abundance of a subset of PCFG whales, ensure that the hunt is as humane as practicable, and protect public safety. This environmental impact statement (EIS) uses the term 'hunt' to include all activities associated with approaching, striking, killing, and landing whales, and the term 'harvest' to mean attaching a flag or buoy to a whale, making a whale fast to a vessel, or landing a whale.

The 1855 Treaty of Neah Bay expressly secures the Makah Tribe's right to hunt whales. To exercise that right under the Ninth Circuit Court of Appeals decision in *Anderson v. Evans* (2004), however, the Makah must obtain authorization from the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS). Two statutes govern any authorization: the Marine Mammal Protection Act (MMPA) (16 United States Code [USC] 1361 *et seq.*) and the Whaling Convention Act (WCA) (16 USC 916 *et seq.*). Specifically, to authorize Makah gray whale hunting, we, NMFS, must perform the following actions:

- Waive the moratorium prohibiting take of marine mammals under Section 101(a)(3)(A) of the MMPA.
- Promulgate regulations implementing the waiver and governing the hunts in accordance with Section 103 of the MMPA.
- Issue any necessary permits to the Makah under Section 104 of the MMPA.

[1] In previous documents we referred to this feeding group as the Pacific Coast Feeding Aggregation or PCFA (NMFS 2008a). In this document we use PCFG, the term adopted by the International Whaling Commission (IWC) and more recent scientific assessments (IWC 2011a).

- Enter into a cooperative agreement with the Tribe for co-management of any gray whale hunt and publish any relevant aboriginal subsistence whaling quotas under the provisions of the WCA.

In February 2005, the Makah Tribe formally requested waiver of the take moratorium under the MMPA to hunt gray whales (Appendix A). We published a notice of intent (NOI) to prepare an EIS in response to the Tribe's request (70 Fed. Reg. 49911, August 25, 2005). In January 2006, the Tribe asked us to take all necessary actions under whatever authorities we may deem applicable, and we announced that we would expand the scope of the EIS to include the WCA (71 Fed. Reg. 9781, February 27, 2006). To assist in our MMPA and WCA determinations, we are preparing this draft EIS under the National Environmental Policy Act (NEPA) as the lead agency reviewing this action (42 USC 4321 *et seq.*). See Subsection 1.2, Legal Framework, for more detail. This is the second draft EIS (DEIS) we have prepared in response to the Tribe's request (Subsection 1.5, Background and Context, describes the first DEIS and our decision to terminate it and prepare a new DEIS). The Tribe's proposal remains the same and is described in Table 1-1. It is described in detail in Section 2, Alternatives.

Table 1-1. Summary of the Makah's Proposed Action

Species restrictions	Hunt ENP gray whales only.
Age/sex restrictions	Prohibit hunting of calves or whales accompanied by calves.
Number restrictions	Harvest up to 20 whales in a 5-year period, with a maximum of 5 whales harvested, 7 struck, and 3 struck and lost per calendar year. Reduce numbers of harvested, struck, and struck and lost whales as necessary in accordance with United States' obligations under the International Convention for the Regulation of Whaling (ICRW), or to prevent the ENP gray whale stock from falling below optimum sustainable population (OSP) levels under the MMPA. Cease hunting in any year if the number of harvested whales exceeds an allowable bycatch level based on matches in the National Marine Mammal Laboratory's photographic identification catalog for PCFG gray whales.[2]
Area restrictions	Hunt within the coastal portion of the Makah U&A, excluding the Strait of Juan de Fuca. Prohibit hunting within 200 yards (183 meters) of Tatoosh Island and White Rock during May to protect nesting seabirds.
Timing restrictions	Prohibit hunting from June 1 through November 30 during any calendar year to avoid intentional harvest of whales feeding off the coast of Washington during the summer feeding period.
Method of hunt restrictions	Hunt using traditional methods, except for the mandatory use of a .50 caliber rifle to kill the whale.
Use restrictions	Limit use of whale products to ceremonial and subsistence purposes. Prohibit the commercial sale or offer for sale of any whale products, except for sale or offer for sale of traditional handicrafts made from non-edible whale parts within the United States.

[2] The National Marine Mammal Laboratory does not maintain a comprehensive PCFG catalog. Rather, a non-governmental organization, Cascadia Research Collective, maintains a database of photographically identified ENP gray whales (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements).

1.1.2 Project Location

The Makah Tribe proposes to resume gray whale hunting in the coastal portion of the Tribe's fishing U&A, as adjudicated by the Western District Court of Washington in *United States v. Washington* (1974 and 1985). The Makah U&A includes marine waters off the northwest coast of Washington State and the western portion of the Strait of Juan de Fuca (Figure 1-1). The Makah's proposed action area (Figure 1-1) is smaller than its adjudicated U&A because the Tribe proposes to exclude the Strait of Juan de Fuca to address concerns about public safety and the effects of hunts on gray whales in that area of its U&A.

Figure 1-1 also shows the larger project area, which encompasses the entire Makah U&A and adjacent marine waters, as well as land areas with the potential to be affected by one or more of the project alternatives. (The entire range of the PCFG is shown in Figure 3-9, Spatial Scales Associated with the Project Area – PCFG, OR-SVI, NWA-SJF (including Makah U&A) Survey Areas.) The project area includes the following sites:

- Beaches where a gray whale may be landed and butchered
- Rocks and islands of the Washington Islands National Wildlife Refuges within the waters of the Olympic Coast National Marine Sanctuary (OCNMS or Sanctuary), where sanctuary resources such as seabirds and hauled-out marine mammals might be affected
- The Makah and Ozette Reservations and the community of Neah Bay (where many tribal members reside and public services are located)
- Other shoreline areas that provide physical or visual access to the Makah's U&A (e.g., vantage points provided by the coastal strip of the Olympic National Park)

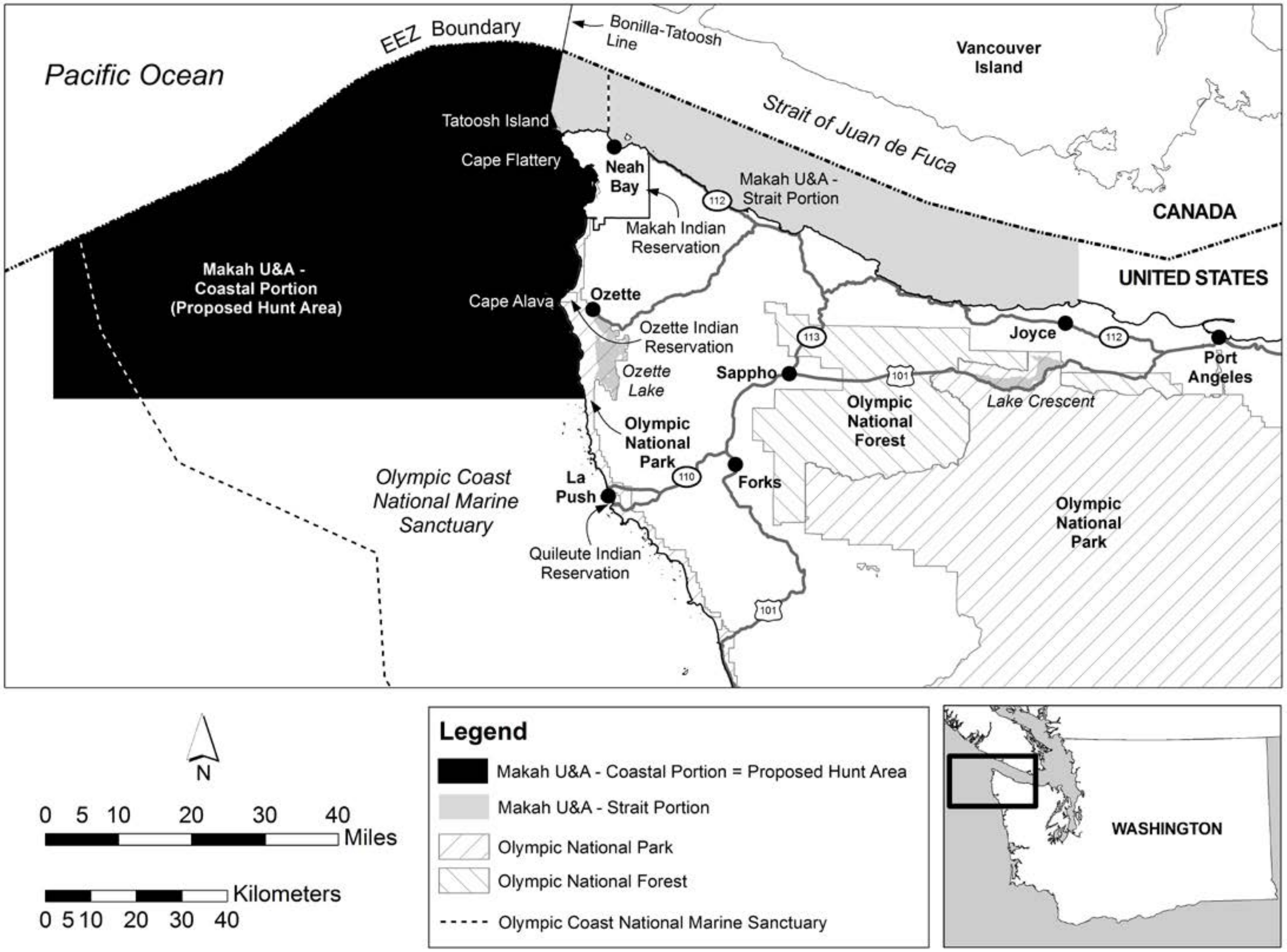

Figure 1-1. Project Area.

1.1.3 Summary of Gray Whale Status

NMFS recognizes two stocks of gray whales in the north Pacific—the ENP stock and a western north Pacific (WNP) stock (Carretta et al. 2014). The ENP gray whale population migrates along the west coast of North America between Mexico and Alaska and some whales are present year-round in the project area. The population sustained historical aboriginal hunting by natives in present-day Russia, Alaska, British Columbia, and Washington State for many centuries, but commercial whaling in the late 1800s and early 1900s decimated the population. Because of a suite of international and national protections (Subsection 3.4.3.1.3, Population Exploitation, Protection, and Status), the population recovered (Rugh et al. 2005). In 1994, ENP gray whales were delisted under the U.S. Endangered Species Act (ESA) (59 Fed. Reg. 31094, June 16, 1994). The current estimated minimum population size is 18,017 animals (Carretta et al. 2014). See Subsection 3.4, Gray Whales, for more information.

The distribution and migration patterns of gray whales in the WNP are less clear. The main feeding ground is in the Okhotsk Sea off the northeastern coast of Sakhalin Island, Russia, but some animals occur off eastern Kamchatka and in other coastal waters of the northern Okhotsk Sea (Subsection 3.4.3.2, Western North Pacific (WNP) Gray Whale). WNP whales were thought to all migrate south in autumn to wintering areas somewhere in the South China Sea, but recent information suggests that some animals feeding in the Okhotsk Sea migrate east, to coastal waters off the west coast of the United States during winter and may transit the Makah U&A. WNP whales are listed as endangered under the ESA. There are currently an estimated 140 animals (excluding calves) in the population (Cooke et al. 2013). Subsection 3.4.3.2, Western North Pacific (WNP) Gray Whale, discusses the scientific uncertainties raised by the recent discovery of WNP migration to the west coast of the United States.

NMFS currently does not recognize the PCFG as a "population stock" as we interpret that term under the MMPA, but we have stated that the PCFG seems to be a distinct feeding aggregation and may warrant consideration as a distinct stock in the future (Carretta et al. 2014). The International Whaling Commission (IWC) found it "plausible" that the PCFG may be a demographically distinct feeding group[3] (IWC 2011a) and has evaluated the United States' request for a quota for the Makah Tribe against its impacts to PCFG whales (IWC 2013a)

[3] Although the IWC has not formally identified the PCFG as a stock, the Scientific Committee (IWC 2012a) noted that its implementation review of eastern North Pacific gray whales (with an emphasis on the PCFG) was "based on treating PCFG as a separate management stock" (which may not be equivalent to a stock as defined under the MMPA).

(Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates). The current estimated minimum population size of the PCFG is 173 animals (Carretta et al. 2014). Subsection 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales, discusses the PCFG in greater detail.

1.1.4 Summary of Makah Tribe's Historic Whaling Tradition

The Makah's tradition of whale hunting dates back at least 1,500 years. Subsistence use of whale products from drift and stranded whales extends back another 750 years before that time, prior to development of hunting equipment and techniques (Wessen, G. as cited in Renker 2012). The gray whale was one of the major whale species the Makah hunted, likely because of its nearshore migration, slow swimming speed, and presence during the summer (Huelsbeck 1988). The fact that the Treaty of Neah Bay is the only treaty between the United States government and a Native American tribe that specifically protects the right to hunt whales suggests the historic importance of whaling to the Makah Tribe (*Anderson v. Evans* 2004). A combination of factors led to the suspension of Makah whaling in the 1920s (Subsection 3.10.3.4.2, Factors Responsible for Discontinuation of the Hunt).

On May 5, 1995, the Makah Tribe formally notified NMFS of its interest in re-establishing limited ceremonial and subsistence whale hunting (Makah Tribal Council 1995), approximately 1 year after NMFS removed the ENP gray whale from the endangered species list. Four years later, the Makah hunted and landed one gray whale. Judicial decisions have since prevented the Tribe from hunting gray whales until certain processes are completed. For more information on historic and contemporary Makah whaling, refer to Subsection 1.4.2, Summary of Recent Makah Whaling — 1998 through 2013, and Subsection 3.10, Ceremonial and Subsistence Resources.

1.2 Legal Framework

The following section describes the legal framework that will guide our decisions related to this project, including environmental review under NEPA, the Treaty of Neah Bay and the federal trust responsibility, species protection and conservation under the MMPA, and governance of aboriginal subsistence whaling quotas under the WCA.

1.2.1 National Environmental Policy Act

Congress enacted NEPA to create and carry out a national policy designed to encourage harmony between humankind and the environment. While NEPA neither compels particular results nor imposes substantive environmental duties upon federal agencies (*Robertson v. Methow Valley Citizens Council* 1989), it does require that they follow certain procedures when making decisions about any proposed major federal actions that may affect the environment. These procedures ensure that an agency has the best possible information before it to make an informed decision regarding the environmental effects of any proposed action. They also ensure full disclosure of any associated environmental risks to the public. Regulations promulgated by the Council on Environmental Quality (40 CFR [Code of Federal Regulations] 1500-1508) contain specific guidance for complying with NEPA.

Under the Council on Environmental Quality regulations, federal agencies may prepare an environmental assessment (EA) to determine whether a proposed action may have a significant impact or effect on the quality of the human environment. Agencies must examine the context of the action and intensity of the effects to determine the significance of impacts. If information in an EA indicates that the environmental effects are not significant, the agency issues a finding of no significant impact (FONSI) to conclude the NEPA review. We issued FONSIs in two prior NEPA assessments of Makah whale hunting proposals. The history of those actions and ensuing court decisions is recounted in Subsection 1.4.3, Other Environmental Assessments and Court Decisions Informing this Action.

An EIS provides a detailed statement of the environmental impacts of the action, reasonable alternatives, and measures to mitigate adverse effects of the proposed actions. Although the MMPA and NEPA requirements overlap in some respects, the scope of NEPA goes beyond that of the MMPA by considering the impacts of the proposed major federal action on non-marine mammal resources, such as human health and cultural resources.

An EIS culminates in a Record of Decision (ROD). The ROD documents the alternative selected for implementation, may recommend further review, attaches any conditions that the agency may require, and summarizes the impacts expected to result from the alternative selected.

NMFS is the lead agency responsible for preparation of this EIS. The Bureau of Indian Affairs is a cooperating agency as defined by the Council on Environmental Quality (40 CFR 1501.6).

1.2.2 Treaty of Neah Bay and the Federal Trust Responsibility

This Subsection provides a brief history of federal-tribal relations, a general legal description of the treaty rights of the Northwest tribes that evolved from that history, a more specific description of the Makah treaty right to hunt whales, the recent history of the Makah's efforts to use their treaty rights, and the current legal framework for implementation of those rights as defined in the Ninth Circuit Court's decision in *Anderson v. Evans* (2004).

Prior to 1871, to allow for the westward expansion of non-Indians, the United States government often entered into treaties with Indian tribes that typically provided for the surrender of large areas of land the Indians occupied. In exchange, the United States recognized permanent homelands (reservations) and sometimes explicitly or implicitly provided for off-reservation hunting, gathering, and fishing rights. Treaties with Indian tribes are the supreme law of the land and generally preempt state laws. Treaty language securing fishing and hunting rights is not a "grant of rights [from the federal government] to the Indians, but a grant of rights from them — a reservation of those not granted" (*United States v. Winans* 1905). In other words, the tribes retain rights not specifically surrendered to the United States (commonly referred to as reserved rights).

The scope of reserved Indian hunting, fishing, and gathering rights that have been recognized by the courts is sometimes very broad and depends on the language of the treaty or the known culture of the tribe at treaty time. Courts have developed rules for interpreting Indian treaties that recognize the communication difficulties between the tribes and treaty negotiators, the imbalance of power between the tribes and the United States, and the fact that the tribes are unlikely to have understood the legal ramifications of the exact wording of their treaties (Cohen 2005). Accordingly, courts liberally construe treaties, resolve ambiguities in the tribe's favor, and "interpret Indian treaties to give effect to the terms as the Indians themselves would have understood them" (*Minnesota v. Mille Lacs Band of Chippewa* 1999).

Twenty Indian tribes located in western Washington State have treaty-protected and adjudicated fishing rights in the Pacific Ocean, Strait of Juan de Fuca, and Puget Sound. The United States government and the Makah Tribe entered into the Treaty of Neah Bay on January 31, 1855, and the Senate consented to its ratification on March 8, 1859 (United States Statutes at Large, Volume 12, Page 939). In addition to reserving the right of taking fish at all usual and accustomed grounds and stations, Article IV of the treaty secured the rights of whaling or sealing. The Treaty of Neah Bay is the only treaty between the United States and an Indian tribe that expressly provides for the right to hunt whales.[4]

1.2.2.1 The Stevens Treaties

"To extinguish the last group of conflicting claims to lands lying west of the Cascade mountains and north of the Columbia River, in what is now the State of Washington, the United States

[4] Article 4 of the 1855 Treaty with the Makah (see Appendix A) states: "The right of taking fish and whaling and sealing at usual and accustomed grounds and stations is further secured to said Indians in common with all citizens of the United States, and of erecting temporary houses for the purpose of curing, together with the privilege of hunting and gathering roots and berries on open and unclaimed lands: Provided, however, That they shall not take shell-fish from any beds staked or cultivated by citizens."

entered into a series of treaties with Indian Tribes in 1854 and 1855" (*Washington v. Washington State Commercial Passenger Fishing Vessel Association* 1979). These treaties are called the Stevens Treaties after Isaac Stevens, the Governor of Washington Territory, who was the United States negotiator. The Stevens Treaties settled the land claims and secured the hunting and fishing rights for numerous tribes, including the Makah Tribe. The promise that the Indian tribes would be guaranteed continued access to a variety of natural resources essential to their livelihood and way of life for future generations was essential for securing Indian consent to the treaties with the United States (*United States v. Washington* 1974). The scope of reserved Indian hunting, fishing, trapping, and gathering rights that courts have recognized depends on the language of the treaty and the circumstances surrounding the treaty negotiations.

1.2.2.2 Scope of the Fishing Right under the Stevens Treaties

The fishing clauses of the Stevens Treaties have been at the center of litigation for more than 100 years, including state attempts to limit the exercise of treaty fishing rights. *United States v. Washington* (1974), commonly referred to as the "Boldt" decision, defined the scope of these treaty rights to fish. The court held that state regulation of treaty fishing was authorized only if reasonable and necessary for conservation. In affirming this decision the Supreme Court also interpreted the Stevens Treaties to secure 50 percent of the harvestable surplus of fish passing through their "usual and accustomed grounds and stations" (*United States v. Washington* 1974) to the tribes, unless their moderate living needs could be met by a lesser amount (*Washington v. Washington State Commercial Passenger Fishing Vessel Association* 1979). The Treaty of Neah Bay was one of the Stevens Treaties reviewed in the *United States v. Washington* (1974) litigation. Although the court's focus in that proceeding was to address the appropriate exercise of the Tribe's fishing rights, in reviewing the treaty, the court noted the following:

> [t]he treaty commissioners were aware of the commercial nature and value of the Makah maritime economy and promised the Makah that the government would assist them in developing their maritime industry. Governor Stevens found the Makah not much concerned about their land . . . but greatly concerned about their marine hunting and fishing rights. Much of the official record of the treaty negotiations deals with this. Stevens found it necessary to reassure the Makah that the government did not intend to stop them from marine hunting and fishing but in fact would help them develop these pursuits (*United States v. Washington* 1974).

Additionally, the court noted the following:

> [i]n aboriginal times the Makah enjoyed a high standard of living as a result of their marine resources and extensive marine trade. . . . The Makah not only sustained a Northwest Coast culture, but also were wealthy and powerful as contrasted with most of their neighbors (*United States v. Washington* 1974).

The Court of Appeals for the Ninth Circuit similarly noted that the specific reservation of the right to whale in the Treaty of Neah Bay "suggests the historic importance of whaling to the Makah Tribe" (*Anderson v. Evans* 2004). The Makah U&A for fishing was defined in a later sub-proceeding under *United States v. Washington* (1985). The Tribe's usual and accustomed whaling and sealing grounds have not been adjudicated.

1.2.2.3 Limitations on the Exercise of Treaty Rights

Treaty rights are not unbounded. The United States Supreme Court has held that the United States Congress has full power over Indian lands and Indian tribes and can abrogate federal Indian treaties (*Lone Wolf v. Hitchcock* 1903) unilaterally, though doing so may implicate Fifth Amendment taking by the federal government and the need for federal compensation (*Menominee Indian Tribe v. United States* 1968; *Hynes v. Grimes Packing Company* 1949; *United States v. Shoshone Tribe of Indians* 1938). The courts will not lightly find that treaty rights have been abrogated (*Menominee Indian Tribe v. United States 1968*). Generally, states cannot regulate treaty hunting and fishing activities (*Menominee Tribe v. United States* 1968). However, the states of Washington and Oregon have some ability to limit the exercise of Indian treaty rights for conservation purposes where such regulation is necessary to sustain the species.

1.2.2.3.1 <u>State Regulation</u>

In the Pacific Northwest, a significant body of law has developed over the last 40 years in response to state attempts to impose regulations that effectively prevented tribal fishermen from taking fish at their usual and accustomed places. In the 1970s, the United States brought litigation on behalf of the Stevens Treaty tribes against the states of Washington and Oregon to establish the treaty right guarantees of access to the usual and accustomed tribal fishing places and to an equitable share of the harvestable fish. The courts held that states could not qualify the treaty right. In a series of decisions responsive to growing concerns regarding the continued viability of the natural resources in question, however, the Supreme Court affirmed the states' police power to regulate tribal fisheries for conservation purposes where such regulation is necessary to sustain the species. The court stated the following:

> [t]he right to take fish at all usual and accustomed places may, of course not be qualified by the State . . . [b]ut the manner of fishing, the size of the take, the restriction of commercial fishing, and the like may be regulated by the State in the interest of conservation, provided the regulation meets appropriate standards and does not discriminate against Indians (*Puyallup Tribe v. Washington Department of Game* 1968).

In reviewing state conservation regulations, the courts use the conservation necessity principle to ensure that the regulation does not discriminate against the treaty tribe's reserved right to fish, is reasonable and necessary to preserve and maintain the resource, and the conservation required cannot be achieved by restriction of fishing by non-treaty fishermen or by other less restrictive means or methods (*United States v. Washington* 1974). As defined in these court decisions, conservation is a term of art and has been defined alternatively as “those measures which are reasonable and necessary to the perpetuation of a particular run or species of fish” (*United States v. Washington* 1974) and as “preserving a ‘reasonable margin of safety’ between an existing level of [salmon] stocks and the imminence of extinction…” (*United States v. Oregon* 1983). Although the courts have imposed limits on the nature of state regulation of treaty fishing, they have also held that “neither the treaty Indians nor the state on behalf of its citizens may permit the subject matter of these treaties to be destroyed” (*United States v. Washington* 1975).

1.2.2.3.2 <u>Federal Regulation</u>

Congress exercises plenary power in the field of Indian affairs. As part of this authority, the United States Supreme Court has consistently held that Congress, through the enactment of laws, has the authority to abrogate or modify the exercise of Indian treaty rights. This includes congressional power to abrogate or modify treaty rights through statutes that address conservation of natural resources. To find abrogation, however, the Supreme Court has required “clear evidence that Congress actually considered the conflict between the intended action on the one hand and Indian treaty rights on the other, and chose to resolve the conflict by abrogating the treaty” (*United States v. Dion* 1986).

In *Anderson v. Evans* (2004), the court found that the MMPA applies to the Makah Tribe and constrains its treaty right to harvest whales to ensure that “the conservation goals of the MMPA are effectuated.” In holding that the MMPA applied to the Tribe, the court stated that “[w]e need not and do not decide whether the Tribe’s whaling rights have been abrogated by the MMPA.” The court also noted that “[u]nlike other persons applying for a permit or waiver under the MMPA, the Tribe may urge a treaty right to be considered” during review of the Tribe’s request (*Anderson v. Evans* 2004).

1.2.2.4 The Federal Trust Responsibility

The United States and Indian tribes have a unique relationship. From the formation of the United States to the present, federal law has recognized Indian tribes as independent political entities with authority over their members and territory (*Worcester v. Georgia* 1832). The United States Constitution provides Congress with the authority to regulate commerce “among the several states, and with the Indian Tribes” (United States Constitution, Article I, Section 8, clause 3). This power to regulate commerce with Indian tribes includes the exclusive authority to enter into treaties and agreements with Indian tribes regarding their rights to aboriginal lands. Central to such treaties and agreements in the Pacific Northwest is the reservation of Indian hunting, gathering, and fishing rights both on and off the reservation. These express and implied reservations preserve the inherent rights of the tribe that have not been limited or abrogated by treaty or federal legislation.

The federal government has a trust responsibility to protect the treaty hunting, fishing, and gathering rights of Indian tribes. As described by the Supreme Court, "under a humane and self-imposed policy which found expression in many acts of Congress and numerous decisions of this Court, [the United States] has charged itself with moral obligations of the highest responsibility and trust" (*Seminole Nation v. United States* 1942). This unique relationship provides the basis for legislation, treaties, and executive orders that grant unique rights or privileges to Native Americans (*Morton v. Mancari* 1974). The trust responsibility requires federal agencies to carry out their activities in a manner that is protective of these express rights *(Gros Ventre Tribe v. United States* 2006). The Ninth Circuit Court of Appeals has held, however, that "unless there is a specific duty that has been placed on the government with respect to Indians, [the government's general trust obligation] is discharged by [the government's] compliance with general regulations and statutes not specifically aimed at protecting Indian tribes" (*Gros Ventre Tribe v. United States* (2006), citing *Morongo Band of Mission Indians v. FAA* (1998); *United States v. Jicarilla Apache Nation*, 131 S.Ct. 2313, 180 L.Ed.2nd 187 (2011)).

Executive Order 13175 (implemented by Department of Commerce Administrative Order 218-8) affirms the trust responsibility of the United States and directs agencies to "establish regular and meaningful consultation and collaboration with tribal officials," and respect tribal sovereignty when developing "Federal policies that have tribal implications." This policy is also reflected in the proposed "American Indian and Alaska Native Consultation and Coordination Policy" (Fed. Reg. 39464, July 3, 2012). NMFS, as an agent of the federal government, has a trust responsibility to Indian tribes. For example, see Secretarial Order 3206 (and the November 5, 2009 Presidential Memorandum regarding Tribal Consultation) and NOAA's Policy on Government-to-Government Consultation with Federally Recognized Indian Tribes and Alaska Native Corporations (NOAA Administrative Order 218-8, June 15, 2014).

1.2.3 Marine Mammal Protection Act

1.2.3.1 Section 2 – General Purposes and Policies

Congress enacted the MMPA to protect and conserve marine mammals and their habitats. Section 2 of the MMPA contains the general purposes and policies of the Act, including congressional findings (16 USC 1361). Congress was concerned that certain marine mammal species and population stocks were in danger of extinction or depletion, and it intended to establish protections to encourage development of those stocks to the greatest extent feasible, commensurate with sound policies of resource management. Therefore, Congress specified that the primary objective of marine resource management under the MMPA is to maintain the health and stability of the marine ecosystem. Section 2 indicates that stocks should not be permitted to diminish beyond the point at which they cease to be a significant functioning element of the ecosystem, and they should not be permitted to diminish below their OSP level (Subsection 3.4.2.1, Marine Mammal Protection Act Management).

1.2.3.2 Section 101(a) – Take Moratorium

To achieve the general purposes and policies of Section 2 of the MMPA, Congress established a moratorium on the taking and importing of marine mammals in Section 101(a) (16 USC 1371(a)). Under the MMPA, 'take' means to "harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal" (16 USC 1362(13)). 'Harassment' is defined as follows:

> . . . any act of pursuit, torment, or annoyance which (1) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A Harassment]; or (2) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B Harassment] (16 USC 1362(18)(A)).

This moratorium is not absolute. Statutory exceptions allow marine mammals to be taken for scientific or educational purposes and to be taken incidentally in the course of commercial fishing. A statutory exemption allows take of marine mammals by Alaska Natives for subsistence purposes or to create and sell authentic native articles of handicraft and clothing. The agency may also waive the take moratorium under Section 101(a)(3).

1.2.3.3 Section 101(a)(3)(A) – Waiver of the Take Moratorium

Section 101(a)(3)(A) authorizes and directs the Secretary of Commerce "from time to time" to "determine when, to what extent, if at all, and by what means, it is compatible" with the MMPA "to waive the Section 101(a) take moratorium" (16 USC 1371(a)(3)(A)). NMFS reviews requests to waive the take moratorium on a case-by-case basis, either when a waiver appears appropriate or when a specific proposal is under consideration. NMFS waives the moratorium only with respect to a particular species or stock and then only to the extent provided in the waiver (Bean 1983). As described in Subsection 3.17.3.1, Waivers of the MMPA Take Moratorium, the waiver process involves a number of steps, is seldom applied for, and has not been used many times.

The following discussion responds to past public comments requesting that we summarize the MMPA procedures for waiving the take moratorium and issuing permits. The primary steps of the MMPA waiver process include:

1. Initial waiver determination
2. Formal rulemaking on the record (including a hearing before a presiding official, such as an administrative law judge, and proposed regulations)
3. Final waiver determination (including final regulations)
4. Permit processing

Preparation of this EIS is one step in a full evaluation of the Makah's request to hunt gray whales and will aid future decisions related to the MMPA as well as under the WCA (discussed in Subsection 1.2.4, Whaling Convention Act).

1.2.3.3.1 Step 1 ─ Initial Waiver Determination

NMFS' Northwest Regional Administrator has the delegated authority in this case to make the initial waiver determination (NMFS 2005a). Section 101(a)(3)(A) of the MMPA contains provisions related to the waiver determination. Any waiver determination must fulfill the following criteria:

1. Be based on the best scientific evidence available
2. Be made in consultation with the Marine Mammal Commission
3. Have due regard to the distribution, abundance, breeding habits, and times and lines of migratory movements of the marine mammal stock in question for take
4. Find that the taking is in accord with sound principles of resource protection and conservation as provided in the purposes and policies of the MMPA (Section 2)

Based on these Section 101(a)(3)(A) criteria, the Regional Administrator will make an initial determination whether to waive the moratorium. If the agency ultimately decides not to waive the take moratorium, it would make that decision publicly available in the Federal Register. If the Regional Administrator makes an initial determination to waive the take moratorium, he would propose regulations to govern any take under Section 103. Section 103(a) specifies that regulations must be "necessary and appropriate to insure that such taking will not be to the disadvantage of those species and population stock and will be consistent with the purposes and policies [of the MMPA in Section 2]" (16 USC 1373(a)).

Section 103(b) requires the agency to consider the effect of such regulations on the following:

- Existing and future levels of marine mammal species and population stocks
- Existing international treaty and agreement obligations of the United States
- The marine ecosystem and related environmental considerations
- The conservation, development, and utilization of fishery resources (not applicable in this case)
- The economic and technological feasibility of implementation

Section 103(c) of the MMPA lists allowable restrictions that regulations may include for takes of marine mammals such as the number, age, size, and sex of animals taken, as well as the season, manner, location, and fishing techniques that may be used (for marine mammals caught in fishing gear incidental to fishing activities). Any regulations would be subject to periodic review and modification to carry out the purposes of the MMPA (16 USC 1373(e)).

1.2.3.3.2 Step 2 ─ Formal Rulemaking on the Record

A preliminary determination to waive must be made on the record after opportunity for an agency hearing; this is a formal rulemaking process detailed in agency regulations at 50 CFR Part 228. Under these provisions, we would appoint an officer to preside over the hearing (presiding official). We would also publish a notice of hearing in the Federal Register regarding the proposed waiver and proposed regulations.

Among other topics, the notice would state the place and date for both a pre-hearing conference and the hearing itself; it would detail how and when to submit direct (written) testimony on the proposed waiver and proposed regulations, and how and when to submit a notice of intent to participate in the pre-hearing conference and hearing.

In the notice of hearing, we would also specifically publish the following (among other topics):

- The proposed waiver and proposed regulations
- The Regional Administrator's original direct testimony in support of the proposed waiver and proposed regulations (additional direct testimony may be submitted at later times)
- A summary of the statements required by Section 103(d) of the MMPA, including the following:
  - Estimated existing levels of gray whales
  - Expected impact of the proposed regulations on the OSP of any gray whale stock
  - Description of the evidence before the Regional Administrator upon which the proposed regulations would be based

    - ➢ Any studies made by or for the Regional Administrator or any recommendations made by or for the agency or the Marine Mammal Commission that relate to the establishment of the proposed regulations
- Issues that may be involved in the hearing
- Any written advice received from the Marine Mammal Commission

The presiding official would examine direct testimony and make a preliminary determination related to the testimonial evidence received. We would make the presiding official's preliminary determination available to the public. After the subsequent pre-hearing conference, the presiding official would decide whether a hearing was necessary. Should the presiding official determine that a hearing was not necessary, the official would publish that conclusion in the Federal Register and solicit written comments on the proposed regulations. After analyzing written comments received, the presiding official would transmit a recommended decision to the NMFS Assistant Administrator.

If, however, the presiding official determined that a hearing was necessary, the official would publish a final agenda for the hearing in the Federal Register within 10 days after the conclusion of the pre-hearing conference. The agenda would list the issues for consideration at the hearing and the parties and witnesses to appear, as well as solicit direct testimony on issues not included in the notice of hearing. The hearing would then occur at the time and place specified in the notice of hearing, unless the presiding official made changes. The hearing would be a court-like proceeding where witnesses would present direct testimony and be subject to cross-examination from parties (or counsel); oral arguments from the parties (or counsel) might also be given to the presiding official. Interested persons would have another opportunity to comment in writing. After the period for receiving these written briefs expired, the presiding official's recommended decision would be transmitted to NMFS' Assistant Administrator.

1.2.3.3.3 Step 3 ─ Final Waiver Determination

Once the NMFS Assistant Administrator received the presiding official's recommended decision, the agency would publish notice of availability in the Federal Register, send copies of the recommended decision to all parties, and provide a 20-day written comment period. At the close of the 20-day written comment period, the NMFS Assistant Administrator would make a final decision on the proposed waiver and proposed regulations. The final decision may affirm, modify, or set aside (in whole or part) the recommended findings, conclusions, and decision of the presiding official. We would publish the decision in the Federal Register, including a statement containing the history of the proceeding, findings, and rationale on the evidence, as well as rulings. If the NMFS Assistant Administrator approved the waiver, we would promulgate the final adopted regulations with the decision.

1.2.3.3.4 Step 4 ─ Permit Authorizing Take

Section 104 of the MMPA governs our issuance of permits authorizing the take of marine mammals. We must publish notice of each application for a permit in the Federal Register and invite the submission of written data or views from interested parties with respect to the taking proposed in the application within 30 days after the date of the notice (16 USC 1374(d)(2)). The applicant for the permit must demonstrate that the taking of any marine mammal under such permit will be consistent with the purposes and policies of the MMPA and the applicable regulations established under MMPA Section 103.

If an interested party requests a hearing in connection with the permit within 30 days of publication of the notice, we may afford an opportunity for a hearing within 60 days of the date of the published notice (16 USC 1374(d)(3)). Any applicant for a permit or any party opposed to a permit may obtain judicial review of the agency's terms and conditions included the permit, or of the agency's refusal to issue a permit (16 USC 1374(d)(4)). A permit issued under MMPA Section 104 (16 USC 1374(b)) must be consistent with applicable regulations and must specify the following:

- The number and kinds of animals authorized to be taken
- The location and manner (which we must determine to be humane) in which they may be taken
- The period during which the permit is valid
- Other terms or conditions that we deem appropriate

The MMPA defines 'humane' as "that method of taking which involves the least possible degree of pain and suffering practicable to the mammal involved" (16 USC 1362(4)).

1.2.3.4 Application of the MMPA to Makah Whaling

The Court of Appeals for the Ninth Circuit has twice reviewed Makah proposals to exercise the treaty right to hunt gray whales. In the most recent decision, the court held that the permit and waiver provisions of the MMPA must be satisfied before we can authorize the hunt (*Anderson v. Evans* 2004). Relying on the "principles embedded in the Treaty of Neah Bay, itself," the court framed the issue for decision as "whether restraint on the Tribe's whaling pursuant to treaty rights is necessary to effectuate the conservation purpose of the MMPA" (*Anderson v. Evans* 2004). The court defined the conservation purpose of the MMPA as "to ensure that marine mammals continue to be significant functioning element[s] in the ecosystem" and not "diminish below their optimum sustainable population" (*Anderson v. Evans* 2004).

Specifically, the court stated:

> . . . [t]o carry out these conservation objectives, the MMPA implements a sweeping moratorium in combination with a permitting process to ensure that the taking of marine mammals is specifically authorized and systematically reviewed. For example, the MMPA requires that the administering agency consider "distribution, abundance, breeding habits, and times and lines of migratory movements of such marine mammals" when deciding the appropriateness of waiving requirements under the MMPA, 16 USC Section 1371 (a)(3)(A). And, when certain permits are issued, the permit may be suspended if the taking results in "more than a negligible impact on the species or stock concerned" (16 USC Section 1371 (a)(5)(B)(ii)). One need only review Congress's carefully selected language to realize that Congress's concern was not merely with survival of marine mammals, though that is of inestimable importance, but more broadly with ensuring that these mammals maintain an "optimum sustainable population" and remain "significant functioning elements in the ecosystem." The MMPA's requirements for taking are specifically designed to promote such objectives. Without subjecting the tribe's whaling to review under the MMPA, there is no assurance that the takes by the tribe of gray whales, including both those killed and those harassed without success, will not threaten the role of gray whales as functioning elements of the marine ecosystem, and thus no assurance that the purpose of the MMPA will be effectuated (*Anderson v. Evans* 2004).

Additionally, the court stated:

> . . . [h]ere the purpose of the MMPA is not limited to species preservation. Whether the Tribe's whaling will damage the delicate balance of the gray whales in the marine ecosystem is a question that must be asked long before we reach the desperate point where we face a reactive scramble for species preservation (*Anderson v. Evans* 2004).

The court found these principles "embedded in the Treaty of Neah Bay" and Supreme Court precedents and stated:

> . . . [j]ust as treaty fisherman are not permitted to totally frustrate . . . the rights of non-Indian citizens of Washington to fish . . . the Makah cannot consistent with the plain terms of the treaty, hunt whales without regard to processes in place and designed to advance conservation values by preserving marine mammals or to engage in whale watching, scientific study, and other non-consumptive uses. (*Anderson v. Evans* 2004).

The court noted that in requiring compliance with the MMPA, "we do not purport to address what limitations on the scope of a permit, if any is issued, would be appropriate." Further, in recognition of the Tribe's unique status the court stated, "[u]nlike other persons applying for a permit or waiver under the MMPA, the Tribe may urge a treaty right to be considered in the

NMFS's review of an application by the Tribe under the MMPA" (*Anderson v. Evans* 2004). The Makah Tribe has informed us that it believes that the Treaty of Neah Bay bars us from denying the Tribe's MMPA application where tribal whaling can be accomplished in a manner consistent with the conservation purposes of the MMPA. According to the Tribe, this means that the whaling would not cause the ENP stock of gray whales to fall below its optimum sustainable population or to cease to be a significant functioning element of the marine ecosystem (Makah Tribe 2005a; Makah Tribe 2006a). Furthermore, the Tribe contends that we may not impose restrictions on the exercise of the Tribe's whaling right, beyond those the Tribe itself proposed in its MMPA waiver and permit application, unless we show such restriction to be necessary to achieve the MMPA's conservation purpose (Makah Tribe 2005a; Makah Tribe 2006a). The Tribe believes its application is conservative and fully consistent with the conservation purpose of the MMPA (Makah Tribe 2005a; Makah Tribe 2006a).

1.2.4 Whaling Convention Act

Congress enacted the WCA to implement the domestic obligations of the United States government under the International Convention for the Regulation of Whaling (ICRW). This EIS analyzes NMFS' domestic authority and responsibilities under the WCA, but it does not analyze the position of the United States as a political body in the international arena. The EIS does, however, describe international whaling governance under the ICRW to provide context for the WCA statutory and regulatory framework and particularly to address issues raised in past public comments.

1.2.4.1 International Whaling Governance under the ICRW

The ICRW is an international treaty signed on December 2, 1946, to "provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry" (ICRW, Dec. 2, 1946, 161 United Nations Treaty Series 72). The United States was an original signatory to the ICRW in 1946. A focus of the ICRW was the establishment of the IWC. Below we describe the functions and operating procedures of the IWC, the IWC's moratorium on commercial whaling, aboriginal subsistence whaling under the IWC, and the United States' preparation for the IWC.

1.2.4.1.1 Functions and Operating Procedures of the IWC

The IWC is an international organization whose membership consists of one commissioner from each contracting government. Under Article V.1 of the ICRW, the IWC's charge is to adopt regulations for the conservation and utilization of whale resources by periodically amending the

Schedule, a document that is an integral part of the ICRW. IWC regulations adopted in the Schedule may do the following:

- Designate protected and unprotected species
- Open and close seasons and waters
- Implement limits on the size of whales taken, and on the time, method, and intensity of whaling
- Specify gear, methods of measurement, catch returns and other statistical and biological records, and methods of inspection for the stocks of large cetaceans under IWC jurisdiction (i.e., baleen and sperm whales)

The IWC seeks to reach consensus on Schedule amendments. When consensus is not possible, a three-fourths majority of all who voted may amend the Schedule (each contracting government has one vote).

Article V.2(b) of the ICRW specifies that amendments to the Schedule must be based on scientific findings. The IWC established the Scientific Committee, consisting of approximately 200 of the world's leading whale biologists, to provide advice on the status of whale stocks. The Scientific Committee meets annually and may also call special meetings as needed to address particular subjects during the year.

Article V.3 of the ICRW governs the procedure for amending the Schedule, including application of IWC whaling regulations. In general, amendments to the Schedule are effective 90 days after the IWC notifies each contracting government of the amendment, unless a contracting government objects. If an objection occurs, the objector and other contracting governments have a certain period to present objections to the IWC. After that period expires, the amendment is effective with respect to all contracting governments that have not presented objections, but it is not effective for the objector(s) until the objection is withdrawn. A contracting government may use this procedure when it considers its national interests or sovereignty unduly affected.

1.2.4.1.2 IWC Commercial Whaling Moratorium

The IWC initially focused on regulation of the commercial whaling industry. In 1982, the IWC approved a moratorium on all commercial whaling in paragraph 10(e) of the Schedule, effectively expanding the 1937 ban on commercial harvest of gray whales and right whales to all large whale species. The commercial whaling moratorium is still in place for all non-objecting parties. Iceland lodged a reservation and Norway and the Russian Federation lodged objections to paragraph 10(e) that are currently effective, so the moratorium does not apply to those countries. The United States was a party to the 1937 agreement that banned commercial whaling of gray whales. The

United States was also instrumental in urging the IWC to adopt the 1982 moratorium on commercial whaling of all species (commercial whaling of all species in the United States has been prohibited nationally since 1971). The United States remains opposed to commercial whaling.

Paragraph 10(e) also states that the commercial whaling moratorium “will be kept under review, based upon the best scientific advice,” and that “the [IWC] will undertake a comprehensive assessment of the effects of [the commercial whaling moratorium] on whale stocks and consider modification of this provision and the establishment of other catch limits” (IWC 2012b). The IWC has been developing a revised management scheme (a management plan for commercial whaling) for the last several years, but has made little progress on its adoption. There is active debate at the IWC about the sustainability of whale stocks, the appropriateness of maintaining the ban on all commercial whaling, and the type and level of supervision of commercial whaling should it resume.

1.2.4.1.3 IWC Aboriginal Subsistence Whaling

The IWC recognizes a distinction between whaling for commercial purposes and whaling by aborigines for ceremonial and subsistence purposes — aboriginal exceptions were incorporated into predecessor treaties to the ICRW and have been a part of the whaling regime under the ICRW since the time of the first Schedule (as used in this EIS, the term ‘aborigines’ refers to indigenous people). The IWC governs aboriginal subsistence whaling by setting catch limits for certain whale stocks in the Schedule after considering requests from contracting governments and/or after consulting with the Scientific Committee. Contracting governments request catch limits on behalf of aborigines in their respective nations, and they submit a proposal to the IWC based on cultural and nutritional needs documented in a needs statement. The IWC considers these requests in setting catch limits, but sets limits for each whale stock and not for specified native peoples. Beginning in 2012, catch limits are in 6-year increments and subject to annual review.

General principles governing aboriginal subsistence whaling are contained in paragraph 13(a) of the Schedule. Section 13(a)(4) prohibits “strik[ing], tak[ing] or kill[ing] calves or any whale accompanied by a calf,” and 13(a)(5) requires that “all aboriginal whaling shall be conducted under national legislation that accords with [paragraph 13 of the Schedule]” (IWC 2012b).

Paragraph 13(b) of the current Schedule (IWC 2012b) sets catch limits for 2013 through 2018. Paragraph 13(b)(2) sets a catch limit of 744 ENP gray whales, limited to 140 whales per year (reviewable annually by the IWC and its Scientific Committee), to “aborigines or a Contracting

Government on behalf of aborigines . . . only when the meat and products of such whales are to be used exclusively for local consumption by the aborigines.” The IWC set this catch limit for the ENP gray whale stock after receiving and considering a joint request from the United States and the Russian Federation. By a bilateral agreement between the United States and the Russian Federation (Ilyashenko and Wulff 2014), the 6-year ENP gray whale catch limit is allocated as 24 whales (up to five per year) for the Makah, and 720 whales (up to 135 per year) for the Chukotka Natives.

Due to some controversy and negotiations about appropriate catch limits for Alaska Eskimo bowhead hunts in 1977 and 1978, a meeting of experts on wildlife science, nutrition, and cultural anthropology convened in Seattle from February 5 to 9, 1979 (the experts in cultural anthropology convened for this meeting were known as the Cultural Anthropology Panel). Their charge was to examine the Alaska Eskimo bowhead harvest, provide data, and develop a report for an IWC Technical Committee examining the aboriginal subsistence whaling processes. The Cultural Anthropology Panel at that meeting developed a working definition of subsistence use (IWC 1979a), a term not defined in the ICRW or the Schedule (but adopted 25 years later by a consensus of the delegates to the 2004 annual meeting of the IWC; Subsection 1.2.4.1.3, IWC Aboriginal Subsistence Whaling):

- The personal consumption of whale products for food, fuel, shelter, clothing, tools, or transportation by participants in the whale harvest.
- The barter, trade, or sharing of whale products in their harvested form with relatives of the participants in the harvest, with others in the local community, or with persons in locations other than the local community with whom local residents share familial, social, cultural, or economic ties. A generalized currency is involved in this barter and trade, but the predominant portion of the products from each whale are ordinarily directly consumed or utilized in their harvested form within the local community.
- The making and selling of handicraft articles from whale products when the whale is harvested for the purposes defined in (1) and (2) above.

A working group convened in 1981 (the *Ad Hoc* Technical Working Group on Development of Management Principles and Guidelines for Subsistence Catches of Whales by Indigenous [Aboriginal] Peoples) agreed to the following working definition of aboriginal subsistence whaling and related concepts (IWC 1982):

- *Aboriginal subsistence whaling* means whaling for purposes of local aboriginal consumption carried out by or on behalf of aboriginal, indigenous, or native peoples who share strong community, familial, social, and cultural ties related to a continuing traditional dependence on whaling and the use of whales.

- *Local aboriginal consumption* means traditional uses of whale products by local aboriginal, indigenous, or native communities in meeting their nutritional, subsistence, and cultural requirements. The term includes trade in items which are by-products of subsistence catches.
- *Subsistence catches* are catches of whales by aboriginal subsistence whaling operations.

The IWC has not formally adopted the 1981 Ad Hoc Technical Working Group's definition of aboriginal subsistence whaling. The same 1981 Ad Hoc Technical Working Group also developed three broad objectives for the IWC to use when evaluating aboriginal subsistence whaling proposals from contracting governments. The IWC did formally adopt these three principles in Resolution 1999-4:

- To ensure that the risks of extinction to individual stocks are not seriously increased by subsistence whaling
- To enable aboriginal people to harvest whales in perpetuity at levels appropriate to their cultural and nutritional requirements, subject to the other objectives
- To maintain the status of whale stocks at or above the level giving the highest net recruitment and to ensure that stocks below that level are moved towards it, so far as the environment permits

The IWC is developing a new procedure for the management of aboriginal subsistence whaling (Donovan 2002). This is an iterative and ongoing effort. The Commission will ultimately establish an Aboriginal Whaling Management Procedure (AWMP) that includes scientific and logistical aspects of the management of all aboriginal fisheries. The scientific component might include some general aspects common to all fisheries, such as guidelines and requirements for surveys and for data. Within the AWMP there would be common components and case-specific components. Until the AWMP is completed the Committee provides advice on a more ad hoc basis, carrying out major reviews according to the needs of the Commission in terms of establishing catch limits and the availability of data. It also carries out brief annual reviews of each stock.

In 2011 the IWC established an ad hoc Aboriginal Subsistence Whaling Working Group tasked with preparing for a planned review of catch limits for aboriginal subsistence whaling at the 2018 Biennial meeting. A proposed expert workshop (expected in 2015) will include a number of complex topics, including but not limited to the following: Types of need (e.g. cultural and nutritional); cultural and sociological variation across whaling communities with regard to conditions of the hunt and methods of distribution of products, including evolution through time; description of the methods used to present information on need to the IWC in an informative manner including an account of types of need and how they are characterized as well as cultural and sociological variation; consideration of approaches to objectively review 'need statements' presented to the IWC; and food security considerations (IWC 2014a).

The IWC does not have a formal definition of aboriginal use of whale products for 'local consumption and distribution.' We interpret the IWC's 2004 subsistence use definition and the current Schedule regarding local distribution as proposed by the Makah to mean that the Makah could share whale products from any hunt within the borders of the United States with the following:

- Relatives of participants in the harvest
- Others in the local community (both non-relatives and relatives)
- Persons in locations other than the local community with whom local residents share familial, social, cultural, or economic ties

1.2.4.1.4 United States' IWC Interagency Consultation

The United States, as a contracting government to the ICRW, recognizes the IWC as the global organization with the authority to manage whaling. The United States negotiating positions at the IWC are advanced by the United States Commissioner to the IWC; the United States Commissioner is appointed by the President and serves at his pleasure. The United States Commissioner is not a federal agency. Negotiating positions advocated by the United States Commissioner on behalf of the United States are not final agency actions; these positions may change during the negotiations. The United States' negotiating positions advocated before the IWC, moreover, may or may not be adopted by the IWC, and any attempt to analyze effects on the human environment would be speculative. The United States Commissioner is not required to conduct an analysis under NEPA of United States negotiating positions, and this EIS does not undertake such an analysis.

The United States nevertheless conducts both a NMFS internal review and a public review of whaling issues before making any requests to revise catch limits in the Schedule. When the United States receives a request (needs statement) from a Native American tribe to whale for subsistence purposes, NOAA's Office of International Affairs, the United States Commissioner to the IWC, and the Department of State first review the needs statement. The United States Commissioner may also consult with other federal agencies as appropriate. Before each IWC meeting, the United States Commissioner presents the draft United States position on whaling issues, including proposals to revise aboriginal subsistence whaling catch limits, to the public at the IWC Interagency Committee meeting. These interagency meetings take place before each full meeting of the IWC, in the Washington D.C. area, and they are open to any United States citizen with an interest in whaling, except for individuals representing foreign interests. Representatives of environmental and animal rights groups, Native American groups, sustainable use groups, and other concerned citizens typically attend. When relevant, Makah whaling issues have been discussed at public IWC Interagency meetings since May of 1995. The 2012 meeting occurred in Silver Spring, Maryland on June 5, 2012; 77 Fed. Reg. 25408, (April 30, 2012). In each case, attendees have reviewed and commented on the draft United States position at the IWC related to requesting revisions of catch limits in the Schedule.

1.2.4.2 National Whaling Governance under the WCA

1.2.4.2.1 United States' Acceptance or Rejection of IWC Regulations

Congress enacted the WCA to implement the domestic obligations of the United States under the ICRW. Under Section 916b of the WCA, the Secretary of State (with concurrence by the Secretary of Commerce) has the vested power to present or withdraw objections to regulations of the IWC on behalf of the United States as a contracting government.

1.2.4.2.2 National Prohibition of Commercial Whaling

Section 916c(a) of the WCA makes it "unlawful for any person subject to the jurisdiction of the United States . . . to engage in whaling in violation of the [ICRW] or of any regulation of the [IWC]." NMFS' regulations prohibit whaling, except for aboriginal subsistence whaling (50 CFR 230.2).

1.2.4.2.3 National Aboriginal Subsistence Whaling

The Secretary of Commerce holds general powers, currently delegated to NMFS, to administer and enforce whaling laws and regulations in the United States, including adoption of necessary regulations to carry out that authority. As noted above, the regulations prohibit whaling, except for aboriginal subsistence whaling, which is defined as "whaling authorized by paragraph 13 of the [IWC] Schedule" (50 CFR 230.2). We publish in the Federal Register the aboriginal subsistence whaling quotas set in accordance with paragraph 13 of the Schedule, together with any relevant restrictions, and incorporate them into cooperative management agreements with tribes (50 CFR 230.6(a)).

We may not necessarily publish a quota, even where an IWC catch limit is set for a particular stock. For instance, we have not published a quota for ENP gray whales for the Makah since

2001, even though the IWC has set a catch limit. To authorize the proposed Makah whale hunting, we would have to publish an aboriginal subsistence whaling quota in the Federal Register annually for the Makah's use. We would also have to enter into a cooperative management agreement with the Makah Tribe.

Publication of a quota, as well as consideration of any cooperative management agreement with the Tribe, is contingent upon completion of this NEPA review and the MMPA formal rulemaking procedures described above. Any published quotas are allocated to each whaling village or tribal whaling captain by the appropriate Native American whaling organization (entities recognized by NMFS as representing and governing the relevant Native American whalers for the purposes of cooperative management of aboriginal subsistence whaling).

WCA regulations track the IWC provisions that prohibit whaling of any calf or whale accompanied by a calf (50 CFR 230.4(c)). They also prohibit any person from selling or offering for sale whale products from whales taken in aboriginal subsistence hunts, except that authentic articles of native handicrafts may be sold or offered for sale (50 CFR 230.4(f)). Regulations also require that whaling not be conducted in a wasteful manner (50 CFR 230.4(k)), meaning a method of whaling that is not likely to result in the landing of a struck whale or that does not include all reasonable efforts to retrieve the whale (50 CFR 230.2).

The WCA and its implementing regulations require licensing and reporting. No one may engage in aboriginal subsistence whaling except a whaling captain or a crewmember under the whaling captain's control. Whaling captains are identified by the relevant Native American whaling organization that must provide evidence or an affidavit that the whale catcher (i.e., vessel) is adequately supplied and equipped and has an adequate crew (WCA Section 916d(d)(1) and 50 CFR 230.4(d)). The license may be suspended if the whale captain fails to comply with WCA regulations (50 CFR 230.5(b)).

If any tribe salvages a stinker (a dead, unclaimed whale found upon a beach, stranded in shallow water, or floating at sea, 50 CFR 230.2), it must provide NMFS with an oral or written report describing the circumstances of the salvage within 12 hours of the event (50 CFR 230.7). No person may receive money for participation in aboriginal subsistence whaling (WCA Section 916d(d) as implemented through 50 CFR 230.4(e)). The whaling captain and Native American whaling organization are also responsible for reporting the number, dates, and locations of strikes, attempted strikes, or landings of whales, including certain data from landed whales, to NMFS (50 CFR 230.8).

1.2.4.3 Application of the WCA to Makah Whaling

The United States seeks IWC approval of an appropriate catch limit before authorizing any aboriginal subsistence whaling under the WCA (NMFS 2001a).

The Makah Tribe believes that the United States' obligation to the Makah Tribe takes precedence over United States obligations under the ICRW (Makah Tribe 2005a). Although the Makah Tribe does not believe that the Makah subsistence harvest requires IWC approval, the Tribe has worked cooperatively with the United States government to obtain that approval. At the IWC's annual meeting held in July 2012, the IWC approved an aboriginal subsistence whaling catch limit of 744 gray whales for 2013 through 2018, limited to a maximum of 140 takes (i.e., lethal takes) per year (IWC 2012b). The catch limit was based on the joint request of the United States and the Russian Federation. A bilateral agreement between the United States and the Russian Federation (Ilyashenko and Wulff 2014) allocates the catch limit between the Makah Tribe and Chukokta Natives, as described above. The United States currently holds the aboriginal subsistence whaling quota for the ENP gray whale stock on behalf of the Makah, but we have not published it in the Federal Register because of the pending regulatory processes described in this EIS.

1.3 Purpose and Need for Action

1.3.1 Purpose for Action

The Makah Tribe's purpose is to resume its traditional hunting of gray whales under its treaty right, as described in detail in Subsection 2.3.2, Alternative 2 (Proposed Action). NMFS' purpose is to implement the laws and treaties that apply to the Tribe's request, including the Treaty of Neah Bay, MMPA, and WCA.

1.3.2 Need for Action

The Makah Tribe's need for the action is to exercise its treaty whaling rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whaling traditions. NMFS' need for this action is to implement its federal trust responsibilities to the Makah Tribe with respect to the Tribe's reserved whaling rights under the Treaty of Neah Bay. In meeting this need, NMFS must also comply with the requirements of the MMPA and the WCA. Under the MMPA, we must protect and conserve the gray whale population; under the WCA, we must regulate whaling in accordance with the ICRW and IWC regulations.

1.3.3 Decisions to Be Made

We are conducting this environmental review under NEPA as a first step in the full evaluation of the Makah's proposal to hunt gray whales. This EIS evaluates the effects of the Tribe's proposed action and six alternative actions (including the No-action Alternative) on the human environment (both social and biological), as well as suitable mitigation measures. By examining the direct, indirect, and cumulative impacts of the proposed action and a full range of alternatives, relative to the No-action Alternative, the EIS will provide information necessary for the NMFS decision maker to make an informed decision on the Tribe's proposed action.

1.4 Background and Context

1.4.1 Summary of Aboriginal Subsistence Whaling Catch Limits

1.4.1.1 Worldwide Catch Limits

Before 1976, the IWC provided an exemption for aboriginal subsistence whaling. Since 1976 (and 1979 for gray whales), the relevant provisions of the IWC Schedule addressing aboriginal subsistence whaling are in paragraph 13. Paragraph 13(a)(5), in particular, provides that "all aboriginal whaling shall be conducted under national legislation that accords with this paragraph." The IWC has regulated aboriginal subsistence whaling through catch limits set under paragraph 13(b) of the Schedule. These limits include the following stocks:

- Bering-Chukchi-Beaufort Seas stock of bowhead whales (the stock of interest to Alaska Natives and Chukotka Natives under management control of the United States and the Russian Federation, respectively)
- ENP gray whale stock (the stock of interest to the Makah Tribe and Chukotka Natives under management control of the United States and the Russian Federation, respectively)
- West Greenland and Central Stocks of minke whales, West Greenland stock of fin whales, and a West Greenland bowhead feeding aggregation (stocks of interest to the Greenlanders under control of Denmark)
- North Atlantic humpback whales (stocks of interest to the Bequians, under control of St. Vincent and the Grenadines)

Canada's First Nation members have also harvested bowhead whales, but they are not currently operating under IWC catch limits set in the Schedule, because Canada is not a party to the ICRW. Maa-Nulth First Nations on Vancouver Island made an agreement with the Canadian government in December 2006 to forgo their traditional right to hunt gray whales for at least 25 years, in exchange for land, a share of mineral and timber resources on that land, and a cash settlement (CBC News 2006; Indian and Northern Affairs 2006).

Subsection 3.17.3.2.3, Aboriginal Subsistence Whaling, provides more detail about aboriginal subsistence whaling, including the contracting governments' reported number of whales harvested.

1.4.1.2 United States Catch Limits

The United States has requested that the IWC revise catch limits in the Schedule on behalf of two native groups: the Alaska Eskimos and the Makah Tribe. The Eskimos and the Makah are the only two native groups in the United States that have asked the government to request revisions to catch limits in the Schedule from the IWC on their behalf. The Eskimos, as Alaska Natives, are exempt from the MMPA take moratorium under Section 101(b).

1.4.1.2.1 Relevant Overview of Requests for Bowhead Whales on Behalf of Alaska Eskimos

Relevant information about the United States' requests for bowhead whale catch limits on behalf of the Alaska Eskimos is presented here because the history gives context to the current IWC process described above in Subsection 1.2.4.1.3, IWC Aboriginal Subsistence Whaling. Like Makah hunting of gray whales, Eskimos have hunted bowhead whales as an important species for subsistence and for social and cultural purposes for at least 2,000 years (Stoker and Krupnik 1993). Hunting bowhead whales in Alaska remains a communal activity that supplies meat and maktak (whale skin and layer of blubber that is used for food) for the entire community, as well as for feasts and during annual celebrations. Formalized patterns of hunting, sharing, and consumption characterize the modern bowhead hunt. The bowhead hunt is the principal activity through which younger generations learn traditional skills for survival in the Arctic. It also provides ongoing reinforcement of the traditional social structure. In addition to being a major source of food, the bowhead subsistence hunt is a large part of the cultural tradition of these communities and helps define their modern cultural identity (Braund and Associates 1997).

Since 1976, the United States, on behalf of the Alaska Eskimos, has requested that the IWC revise the bowhead catch limits in the Schedule, and the IWC has set catch limits for the bowhead whale stock in the Schedule after considering the nutritional and cultural need for bowhead whales by Alaska Eskimos and the level of harvest that is sustainable. The United States and the Russian Federation share a quota based on the IWC 6-year catch limits (2013 through 2018) for the Western Arctic bowhead stock, approved at the annual meeting of the IWC in July of 2012. The catch limit is allocated between the United States and the Russian Federation through a bilateral agreement (Wulff and Ilyashenko 2014).

1.4.1.2.2 Overview of Requests for ENP Gray Whales on Behalf of the Makah

Prior to 1989, the IWC had set an annual aboriginal subsistence catch limit based on a request on behalf of Chukotka natives. On May 5, 1995, approximately 1 year after the ENP gray whale was removed from the endangered species list, the Makah Tribal Council formally notified NMFS of its interest in re-establishing ceremonial and subsistence hunts for gray whales (Makah Tribal Council 1995). The Tribe anticipated harvesting only one or two whales initially, but included five as the maximum extent of the yearly harvest, if it determined that it could use additional whales effectively and allocate them to each of five ancestral villages (Makah Tribal Council 1995). The Makah agreed not to sell whale meat commercially, developed a comprehensive needs statement, and entered into a cooperative management agreement with NMFS to manage the whale hunt. At the 1995 annual meeting of the IWC, the United States did not request that the IWC revise the Schedule to set a catch limit for the ENP gray whale stock, but informed the IWC that it intended to submit a formal proposal on the Makah's behalf in the future (IWC 1996).

At the annual meeting of the IWC in 1996, the United States, on the Makah's behalf, requested that the IWC revise the Schedule to set a catch limit for the ENP gray whale stock of 20 ENP gray whales over 5 years (with no more than five in any one year) from 1997 through 2000. At the Aboriginal Subsistence Whaling Subcommittee meeting, many delegates supported the United States' request. Other delegates indicated they would vote against the proposal. One reason given for this opposition was that the United States did not ask the Russian Federation to share the existing 1995 to 1997 catch limit of 140 ENP gray whales per year, which was based on the cultural and nutritional needs of the Chukotka Natives (IWC 1997; 63 Fed. Reg. 16701, April 6, 1998). Instead, the United States adhered to a prior position that each contracting government requesting a revision to the Schedule for aboriginal subsistence whaling catch limits must submit its own proposal before the IWC (IWC 1997; 63 Fed. Reg. 16701, April 6, 1998). Opponents noted that granting the United States' request would increase the total ENP gray whale catch limit beyond what had already been set by the IWC in paragraph 13(b)(2) of the Schedule (IWC 1997). At the 1996 meeting, the Russian Federation had also requested a catch limit of five bowhead whales a year, but withdrew its request when a consensus could not be reached among delegates. The bowhead stock catch limit was already set for the United States and was not shared with Russia (IWC 1997).

Another reason for the opposition was that some delegates questioned whether the Makah had a "continuing traditional dependence" on whaling (IWC 1997), a component of the working definition for aboriginal subsistence whaling developed by the 1981 Ad Hoc Technical Working

Group (Subsection 1.4.1.2.1, Relevant Overview of Requests for Bowhead Whales on Behalf of Alaska Eskimos). The delegates noted that the Makah had not hunted gray whales since the 1920s (IWC 1997).

United States delegates and Makah representatives responded that the Makah Tribe had continued aspects of its whaling tradition through names, dance, songs, and other cultural traditions (IWC 1997; United States 1996). The United States also noted that nutritional need is a factor in considering and setting aboriginal subsistence whaling catch limits, but not a threshold requirement. United States delegates used the example of the IWC setting a catch limit for the bowhead stock for many years after considering the United States' requests on behalf of the Alaska Eskimos, even though the Nutrition Panel at the 1979 workshop for aboriginal subsistence whaling of bowhead concluded that nutritional needs of Eskimos could be met through local subsistence or western-type foods (IWC 1979b; United States 1996). Moreover, the Makah needs statement (Renker 1996) had demonstrated a continued subsistence reliance on traditional marine foods available to the Makah, and a nutritional need based on poverty and economic conditions on the Makah Reservation (Renker 1996; United States 1996). The United States noted that federal agents in the last 5 decades had actively prevented Makahs from consuming and utilizing whales that drifted onto Makah beaches, by burying or burning the drift whales and by threatening Makah members, who tried to access the products, with jail and other federal sanctions (United States 1996). As late as the 1970s, federal agents were still entering Makah households and searching freezers for the presence of marine mammal products (United States 1996).

Attendees of the 1996 meeting were also aware of other conflict regarding the Makah's proposal to hunt; the United States House of Representatives Committee on Resources had unanimously passed a resolution expressing opposition to the Makah hunt (United States Congress 1996), and some members of the Makah Tribe testified against the United States proposal at the IWC meeting. The United States made a statement in appreciation of the support from some delegates, noted the reservations expressed by others, and after consultation with the Makah Tribe announced that it was withdrawing its request for an amendment to the Schedule for the gray whale catch limit. The United States asked the IWC to defer consideration until the next year, when the ENP gray whale catch limit was due to expire and the needs of the Chukotkan people were also determined (IWC 1997).

In preparation for the annual meeting of the IWC in 1997, the United States considered comments made at the 1996 meeting that the gray whale catch limit should be shared with the Russian

Federation, making the combined requests 140 rather than 145 gray whales per year (63 Fed. Reg. 16701, April 6, 1998). The gray whale catch limit set in the Schedule for the Russian Federation (acting on behalf of the Chukotka Natives) was due to expire in 1997, so the Russian Federation would have to propose a Schedule amendment for a new catch limit from 1998 through 2002 (63 Fed. Reg. 16701, April 6, 1998). After extensive discussions with the Alaska Eskimo Whaling Commission and the Makah Tribe, as well as an internal policy review, the United States delegation consulted with the Russian Federation delegation on the appropriate formulation for a request (63 Fed. Reg. 16701, April 6, 1998). The Makah made efforts to augment their needs statement and request, including conducting research and training on the proposed method of hunting whales (such as conducting field tests of rifles with Dr. Ingling, a veterinarian with IWC experience). They also gathered more information about the nutritional value of subsistence foods in their diet.

At the Aboriginal Subsistence Whaling Subcommittee meeting on October 18, 1997, the United States raised several points in support of the proposal: (1) law (the Treaty of Neah Bay specifically reserves the right of the Makah to hunt whales), (2) culture (the Makah have a 1,500-year tradition of whaling that has been of central importance to their culture), (3) science and conservation (there would be no adverse conservation impacts to the stock), and (4) Makah progress on improving the needs statement and request since the last IWC meeting (United States 1996; IWC 1998). Related to this last point, Dr. Ingling presented results of field trials on the weapon, ammunition, and techniques to be used in the Makah hunt (Ingling 1997; IWC 1998). A representative of the Makah Tribal Council also spoke, emphasizing the central focus and importance of whaling to Makah culture (IWC 1998). Opponents again raised concerns about the interruption in the Makah whaling practice. Some delegates thought the Makah did not demonstrate nutritional and/or cultural need, based on the 1981 Ad Hoc Technical Working Group definitions of aboriginal subsistence whaling and consumption, while others stated that discontinuity of whaling practice should not be held against the Makah, because they were deprived of cultural and traditional rights (IWC 1998). Some delegates thought the Makah had established cultural need beyond a doubt (IWC 1998).

At the 1997 IWC plenary session, the United States and the Russian Federation presented joint requests for bowhead and ENP gray whale catch limits to accommodate the needs of two aboriginal groups hunting from a single stock (Alaska Eskimos and Chukotka Natives hunting bowheads and the Makah Tribe and Chukotka Natives hunting ENP gray whales). This was the first year in which two contracting governments simultaneously requested revisions to the

Schedule for catch limits from the same stock. For the bowhead stock, delegates considered the joint request and adopted the catch limit of 280 bowhead whales for the 1998 through 2002 5-year period, with a maximum limit of 67 per year, by consensus on the afternoon of October 22, 1997 (IWC 1998). The bowhead catch limit was allocated between the Russian Federation and the United States by a bilateral agreement.

For the ENP gray whale stock, the joint request of 620 gray whales for the 1998 through 2002 5-year period, with a maximum limit of 140 gray whales per year, was debated in IWC plenary session on the afternoon of October 22, 1997 (63 Fed. Reg. 16701, April 6, 1998). Several delegates opposed the Makah Tribe's request, while others supported it (IWC 1997). Some delegates suggested making an amendment to the introductory portion of the proposal. The debate session then adjourned to allow for consultation among the delegates (63 Fed. Reg. 16701, April 6, 1998).

Specifically, two delegates proposed that the following words be added to paragraph 13(b)(2) of the Schedule: "whose traditional subsistence and cultural needs have been recognized by the International Whaling Commission" (IWC 1998). United States delegates responded that the words "by the International Whaling Commission" were not acceptable, because the IWC had no established mechanism for recognizing such needs, other than adoption of a catch limit in the Schedule (63 Fed. Reg. 16701, April 6, 1998). The United States delegates expressed their understanding that adoption of a catch limit in the Schedule constituted IWC approval, with no further action required. A clear majority of Commissioners then expressed their support for the United States' approach (63 Fed. Reg. 16701, April 6, 1998).

When the plenary session resumed, the Chair announced consensus. The joint request of the United States and the Russian Federation for an ENP gray whale catch limit was adopted on October 23, 1997, with the addition of the words "whose traditional aboriginal subsistence and cultural needs have been recognized" to the Schedule language (63 Fed. Reg. 16701, April 6, 1998; IWC 1998). The ENP gray whale catch limit was allocated between the Russian Federation and the United States by a bilateral agreement (120 gray whales per year for the Chukotka Natives, and an average of four gray whales per year, with a maximum of five, for the Makah).

At the annual meeting of the IWC in 2002, the IWC adopted by consensus a catch limit of 620 ENP gray whales for the 2003 through 2007 5-year period. The catch was limited to 140 takes per year, based on a second joint request of the United States and the Russian Federation (IWC Schedule 2002), which was similar to the first successful joint request in 1997. The United States and Russian Federation then allocated the ENP gray whale catch limit by bilateral agreement, to a maximum of 20 whales over the 5-year period and up to five whales annually for the Makah, and a maximum of 600 gray whales over the five-year period and up to 135 per year for the Chukotka Natives.

At the annual meeting of the IWC in 2003, the Russian Federation noted anomalies in the Schedule about the way that Chukotka Natives are treated compared with other aboriginal groups operating under aboriginal subsistence whaling auspices (IWC 2004a; IWC 2004b). They proposed changes to the Schedule, including changes to paragraph 13(b)(2). Paragraph 13(b)(2) read as follows:

> [t]he taking of gray whales from the Eastern stock in the North Pacific is permitted, but only by aborigines or a Contracting Government on behalf of aborigines, and then only when the meat and products of such whales are to be used exclusively for local consumption by the aborigines whose traditional aboriginal subsistence and cultural needs have been recognized. . . .

The Russian Federation proposed to delete the words "whose traditional aboriginal subsistence and cultural needs have been recognized" (IWC 2004a; IWC 2004b). The Russian Federation's stated objective was to achieve consistency in the Schedule and to, therefore, eliminate discriminatory behavior against the native peoples of Chukotka, because they interpret such language restrictions as preventing the important practice of cultural exchange of goods among indigenous peoples (IWC 2004a; IWC 2004b). The IWC subsequently charged a small group, comprising the Russian Federation, Denmark, Australia, the United States, and the IWC Secretariat, to review paragraph 13 of the Schedule to determine how to achieve consistency across aboriginal subsistence whaling operations (IWC 2004a).

The small group submitted a report to the Aboriginal Subsistence Whaling Subcommittee at the annual meeting of the IWC in 2004 (IWC 2005a; IWC 2005b), together with proposed changes to the Schedule. The report had two key recommendations: (1) move the prohibition on take of calves and mother/calf pairs to the general principles governing all hunts in paragraph 13(a), and (2) delete the language, "the aborigines whose traditional aboriginal subsistence and cultural needs have been recognized" from paragraph 13(b)(2) of the Schedule (IWC 2005a; IWC 2005b). The latter recommendation was related to the Russian Federation's interpretation that the quoted provision violated the human rights of Chukotka Natives, because the restriction was not included in other subparagraphs governing aboriginal subsistence whale hunts and, therefore, improperly discriminated against the Chukotka Natives (IWC 2005a; IWC 2005b). The Russian Federation maintained that the Chukotka Natives have equal rights to other aboriginal communities to use whale products (IWC 2005a; IWC 2005b).

At the 2004 IWC plenary session, delegates adopted the report of the small group and the proposed Schedule amendments by consensus, with one revision (they retained a calf and mother/calf take prohibition specific to St. Vincent and the Grenadines). Since 2004, the Schedule has read as follows for the ENP gray whale stock catch limit:

> [T]he taking of gray whales from the Eastern stock in the North Pacific is permitted, but only by aborigines or a Contracting Government on behalf of aborigines, and then only when the meat and products of such whales are to be used exclusively for local consumption by the aborigines (IWC Schedule 2005 and subsequent years, paragraph 13(b)(2)).

The IWC also adopted the 1979 Cultural Anthropology Panel's definition of subsistence use in 2004. See Subsection 1.2.4.1.3, IWC Aboriginal Subsistence Whaling, for more details about the text of the current Schedule, as well as for the text of the formally adopted definition on subsistence use.

On February 14, 2005, the Makah initiated the current proposal to hunt ENP gray whales and submitted a request for a waiver of the MMPA take moratorium to NMFS. NMFS had not published the 2003 through 2007 quota under the WCA because of the 2004 decision in *Anderson v. Evans*. In October 2005, the House of Representatives Committee on Resources passed a non-binding resolution (House of Representatives Congressional Resolution 267) by a vote of 21 to 6, expressing disapproval of the MMPA waiver process and stating that the United States should uphold the treaty rights of the Makah Tribe. The Committee's report (House Report 109-283) was placed on the House of Representatives' calendar without further action.

At the May 2007 IWC meeting, the United States and the Russian Federation again made a joint request for an ENP gray whale catch limit from the IWC for the 2008 through 2012 5-year period under similar terms as the last catch limit for 2003 through 2007. The catch limit was approved by consensus. At the July 2012 meeting, the IWC agreed to biennial meetings and set a 6-year catch limit to match the Commission meeting schedule. Commissioners at the 2012 meeting approved quotas for the hunts of Bering-Chukchi-Beaufort Seas bowhead whales (by the United States and Russian Federation), eastern North Pacific gray whales (by the Russian Federation and the United States), and western North Atlantic humpback whales (St. Vincent and the Grenadines). Given the proposed move to biennial meetings, the quota block was extended to 6 years by a vote of 48 to 10 (IWC 2012c). The ENP gray whale catch limit was set at 744 over the 6-year period, not to exceed 140 in any single year (IWC 2012b).

1.4.2 Summary of Recent Makah Whaling ─ 1998 through 2014

In 1998, NMFS published in the Federal Register a yearly quota of up to five gray whales for the Makah (63 Fed. Reg. 16701, April 6, 1998), operating under the IWC's 1998 to 2002 5-year catch limit. Although the Makah Tribal Council issued several whaling permits and tribal whalers conducted a number of practice exercises, they did not actually hunt whales that year. Protest activities and conflicts near and on the shores of Neah Bay during 1998 are described in Public Safety, Subsection 3.15.3.4, Behavior of People Associated with the Hunt. Protest vessels mobilized on November 11, 1998, but in response to a false report that the Tribe was hunting and had harvested a whale (United States Coast Guard [Coast Guard] 1998).

During the spring northward migration in 1999, NMFS again published in the Federal Register a yearly quota of up to five gray whales for the Makah (64 Fed. Reg. 28413, May 26, 1999). The Makah Tribal Council issued a 10-day whaling permit to a Makah whaling captain on May 10, 1999, based on the recommendation of the Makah Whaling Commission acting in accordance with the 1998 Gray Whale Management Plan. Whale hunting spanned 4 nonconsecutive days (May 10, 11, 15, and 17) and all hunts were conducted in the coastal portion of the Makah's U&A, south of Cape Flattery (i.e., outside the Strait of Juan de Fuca) to target whales migrating northward. Two vessels and crews were directly involved in the whale hunting activities, including the Makah whaling crew in their canoe, *The Hummingbird*, and a rifleman, backup harpooner, and diver on board the tribal chase boat. NMFS and Makah tribal fisheries observers were on board the NOAA observer boat *Research II*. In addition, media helicopters, one or two chartered media vessels, protest vessels, Coast Guard law enforcement, and shore-based supporters and opponents were present most of the time. A tribal commercial fishing boat, acting as a support vessel, was also nearby and available to assist the whalers.

On May 10, 1999, the first day of whale hunting, the Makah crew searched for gray whales within 3 miles (5 km) of shore near Father and Son Rock, Cape Alava, Spike Rock, Umatilla Reef, and Point of the Arches (Gosho 1999; United States Coast Guard 1999a). At least four whales were sighted throughout the day, with three of the four sightings occurring in 115 to 134 feet (35 to 41 meters) of water (Gosho 1999). The observers did not see calf-sized whales in the area (NMFS 1999). The Makah whaling crew threw one harpoon at a whale, but missed it (Gosho 1999; NMFS 1999; NMFS and Makah Tribal Council 2000). The hunt was disrupted by vessel-based protesters who maneuvered between the two Makah vessels and the whales. Protesters tried to scare off the whales, and they also fired flares and smoke flares at the Makah whaling party vessels (NMFS 1999; Sunde et al. 1999; United States Coast Guard 1999a).

Because most of the hunting occurred south of the Coast Guard's regulated navigation area (RNA), a 500-yard (457.2-meter) moving exclusionary zone (MEZ) around the Makah vessels was not in effect (NMFS 1999). Coast Guard officials detained two of the protesters, who they subsequently cited for grossly negligent operation of a vessel, and the Clallam County sheriff then arrested the protesters for reckless endangerment (NMFS 1999; Sunde et al. 1999; United States Coast Guard 1999a). At least three media helicopters were present (United States Coast Guard 1999a). Hunting on May 11 (day two) continued in the same area, but the Makah whaling captain called it off in a few hours because of poor weather conditions (Gosho 1999; NMFS 1999). No whales were sighted or approached.

Whale hunting resumed on May 15, 1999, day three, near Father and Son Rock, Ozette Island, and the Bodeltehs (Gosho 1999), south of the RNA (NMFS 1999) and within 2 miles (3 km) of shore. Several gray whales were sighted in 87- to 95-foot-deep (26.5- to 29-meter-deep) water, but the Makah crew was unable to maneuver *The Hummingbird* close enough to throw harpoons and was again interrupted by protest vessels (Gosho 1999). Around 11:00 a.m., the whalers sighted a whale and threw a harpoon, which was assumed to contact the whale because the wooden harpoon holder was split, and the float disappeared underwater for a short time (Gosho 1999; NMFS 1999). The strike did not appear to penetrate or embed in the animal because the harpoon head was intact and clean, the throw was parallel to the animal (rather than perpendicular), and the float resurfaced (Gosho 1999; NMFS 1999).

Because the harpoon did not embed in the whale and did not appear to cause serious injury, it did not meet the definition of a strike under the 1998 Gray Whale Management Plan (Gosho 1999; NMFS 1999). Under that plan, a strike counted only if the harpoon embedded in the whale and if it might have resulted in death or serious injury. About an hour later, the Makah harpooner threw another harpoon and missed (Gosho 1999).

Protest vessels were active around the whalers much of the day. Two protest vessels came into contact with whales; one vessel ran over the top of a whale and temporarily stunned it, while another vessel hit the flukes of a diving whale beside the Makah canoe (NMFS 1999). The Coast Guard cited four vessels for grossly negligent operations and/or MMPA take infractions, and three of the vessels were taken into federal custody (NMFS 1999).

On May 17, 1999 (the fourth and final day of whale hunting), the Makah crew continued hunting southwest of Father and Son Rock, south of the RNA. No protest vessels attempted to disrupt the hunt, but three media helicopters covered events throughout the day (United States Coast Guard 1999b). At 6:55 a.m., the Makah crew sighted a whale and pursued it in the canoe; the whale surfaced on the right side of the canoe, and the crew harpooned it as it moved across the bow of the canoe, approximately 1.5 miles (2.4 km) from shore (Gosho 1999; NMFS 1999). The harpoon remained affixed to the whale, which pulled the harpoon line and floats underwater and towed the canoe (Gosho 1999; NMFS 1999). The whaling crew in the canoe held the harpoon line while the chase boat approached the whale for the Makah rifleman to kill the animal with a .577 caliber rifle. The gunner fired the first and second shots at 6:58 a.m.; both shots missed (Gosho 1999). At 7:01 a.m., a third shot was fired, striking the whale behind the blowhole and slightly to the left, momentarily stunning the whale (Gosho 1999). A second harpoon was also thrown at the whale, striking it on the right side towards the rear (Gosho 1999). The fourth and final shot was fired at 7:03 a.m., striking the whale behind the blowhole slightly to the right, and leaving the whale motionless at the surface (Gosho 1999). Immediately after the final shot, a third harpoon was thrown, striking the whale on the right side (Gosho 1999). The total time to death, from the initial harpoon strike to the last shot that dispatched the whale, was 8 minutes.

The body of the whale sunk and was supported by the lines on the three attached harpoons (Gosho 1999). A Makah diver attached a heavier line around the tail stock of the whale for towing (Gosho 1999), and the whale was towed by a Makah support vessel to inside the breakwater at Neah Bay, where tribal members had gathered on the beach to celebrate the hunt. The whale was transferred from the support vessel to four canoes from various Washington Indian tribes, led by the crew of the Makah *Hummingbird* canoe, and towed from the deeper part of the breakwater into the shallow water at the edge of the beach. The whale was butchered following tribal ceremonies. Tribal members removed almost all edible portions of the meat and blubber from the whale by midnight. NMFS biologists collected samples from internal organs after tribal members removed the meat and took it home or to the community freezer (Gosho 1999; NMFS 1999). Tribal members flensed small portions of meat the next day to prepare the skeleton for a museum display (NMFS 1999; NMFS and Makah Tribal Council 2000). Tribal members consumed the meat and blubber during tribal ceremonies (Gosho 1999; NMFS and Makah Tribal Council 2000; NMFS 1999).

According to measurements taken by NMFS and tribal observers, the harvested whale was a non-lactating female that measured 30 feet, 5 inches (9.27 meters) long. Fluke width was 7 feet, 4 inches (2.2 m). The whale could not be weighed, but, based on gray whales taken by the Russian harvest of similar length and body condition, it was estimated to weigh approximately 5 to 7 metric tons. Age could not be determined either, but, based on similar lengths of whales taken in the Russian harvest, it was probably more than 2 years old. An examination of the skull during butchering revealed that the third shot struck the ridge of the skull, shattering it, and proceeded back into the muscle near the left flipper, where whalers found the bullet (the bullet was intact with no deformation). The fourth shot struck the skull above the occipital condyle and entered the braincase; it likely caused instantaneous loss of consciousness and death (Gosho 1999).

During the fall/winter southward migration in 1999/2000, the Makah Tribal Council did not issue any whaling permits because weather conditions were unsuitable. Hunting began during the spring northward migration for 7 days between April 17, 2000 and May 29, 2000 (Gearin and Gosho 2000). The Makah tribal whalers actively hunted gray whales in the coastal portion of the Makah U&A south of Cape Flattery for 7 days, during which no whales were harvested, struck, or struck and lost (Gearin and Gosho 2000). Except for a few approaches near Makah Bay, most hunting occurred south of Point of Arches near Father and Son Rock. Makah whalers threw harpoons on three occasions, but the harpoons did not attach to a gray whale on any of these attempts. The first two throws appeared to be complete misses (Gearin and Gosho 2000). The third throw may have grazed the whale; however, the harpoon did not implant or detach (Gearin and Gosho 2000). Most of the whales in the area during the hunt were large, single individuals. The whales appeared to be actively migrating, because the average time between surface sightings (i.e., the average dive time) was about 8 minutes, which is 4 or 5 minutes longer than the average dive time for whales feeding or resting locally, and the whales were farther offshore (i.e., 80 to 100 feet (24.4 to 30.5 meters) deep rather than 30 to 60 feet (9.1 to 18.3 meters) deep) (Gearin and Gosho 2000).

All hunts occurred within the Coast Guard’s RNA and MEZ, and all harpoon attempts were made within 2.5 miles (4 km) of shore (Gearin and Gosho 2000). During the first 2 days of hunting (April 17 and 20), protesters disrupted the hunts (Gearin and Gosho 2000). On April 20, Coast Guard personnel boarded two protest vessels and issued warnings (United States Coast Guard 2000). One of the vessels entered the 500-yard (457.2-meter) MEZ on three occasions subsequent to the Coast Guard advisory; the Coast Guard again intercepted and warned it (United States Coast Guard 2000). On at least one of these three entrances into the MEZ, the vessel entered the 500-yard (457.2-meter) MEZ at high speed and was intercepted within 50 yards (45.7 meters) of the Makah’s canoe (Gearin and Gosho 2000). Two individuals on jet skis also entered the MEZ, making high speed charges at the Makah canoe (United States Coast Guard 2000). The Coast Guard intercepted both jet skiers. One jet skier ran into a Coast Guard vessel and sustained shoulder injuries; Coast Guard personnel retrieved the individual from the water, placed her under arrest, and transported her to Olympic Memorial Hospital (United States Coast Guard 2000). The

Coast Guard also intercepted and arrested the second jet skier, and transferred him to the Clallam County sheriff's office (United States Coast Guard 2000). After a temporary delay, hunting resumed for 5 nonconsecutive days in May (May 6, 7, 10, 12, and 29). One to three protester vessels were present during these times, but they did not enter the MEZ to disrupt whale hunting (Gearin and Gosho 2000). Media helicopters were present during most of the whale hunting and appeared to comply with the Sanctuary's 2,000-foot (609.6-meter) minimum allowable flight altitude.

Makah whalers had intended to continue whaling into June, but the Makah Tribal Council did not issue any permits after the June 9, 2000 ruling by the Court of Appeals for the Ninth Circuit in *Metcalf v. Daley* (2000). The Makah Tribal Council did not issue any whaling permits during the gray whale southward migration in fall/winter 2000.

The whale harvested in 1999 is the only whale that the Makah have harvested (that is, hunted and successfully landed) in contemporary times. Some Makah members have, however, participated in whale hunt research, education, and training with other indigenous groups. In August of 2005, for instance, two Makah members and a tribal whale biologist traveled to the eastern shores of the Russian Federation. The biologist was involved in an IWC scientific exchange to evaluate the type of data that Chukotka Natives collected in their hunts and to evaluate the logistics of studying the *stinky whale phenomenon* (whales that have a strong chemical smell and are inedible). The Makah members participated in a cultural exchange to observe the Chukotka gray whale hunts and to receive training in whale hunting techniques and whale butchering.

On September 8, 2007, five members of the Makah Indian Tribe hunted and killed a gray whale in the Strait of Juan de Fuca in a hunt that was not authorized by the Tribe or NMFS. This unauthorized hunt did not comply with numerous provisions and restrictions defined in the Tribe's application, and both the Tribe and NMFS made statements condemning the unlawful hunt (Hogarth 2007; Rosenberg 2007).

The five tribal members used two boats and had in their possession a .577 caliber rifle and a Weatherby .460 caliber rifle (*U.S.A. v. Gonzales et al*. 2007). One of the boats and all of the rifles belonged to the Tribe and were obtained by one of the members of the hunting party (*U.S.A. v. Gonzales et al.* 2007). Sometime on the morning of September 8, the hunters approached a gray whale approximately 40 feet (12.2 meters) long near Seal Rock and harpooned it with at least five harpoons (Mapes 2007). They then shot the whale at least 16 times (*U.S.A. v. Gonzales et al.* 2007). According to a report by the Tribe, none of the members of the hunting party had received tribally sanctioned training in use of the weapons to kill gray whales (Scordino 2007a). A tribal biologist who evaluated the whale's condition in the afternoon of September 8 counted four visible harpoons and 16 bullet holes (Scordino 2007b). The whale died shortly after 7:00 p.m. on September 8 (Scordino 2007b).

On October 5, 2007, the five tribal members were indicted in federal court for unauthorized whaling, unauthorized take of a marine mammal, and conspiracy to engage in unlawful whaling (*U.S.A. v. Gonzales et al.* 2007). On November 16, 2007, the five were charged in tribal court for violating the Tribe's gray whale management plan, violating state and federal laws, and reckless endangerment (Casey 2007; *Makah Tribe v. Andrew Noel* 2007). On March 27, 2008, three of the tribal members entered guilty pleas to unlawful taking of a marine mammal in violation of the MMPA (*U.S.A. v. Gonzales* 2008; *U.S.A. v. Parker* 2008; *U.S.A. v. Secor* 2008). On April 7, 2008, after a Bench Trial on Stipulated Facts, the court found the remaining two tribal members guilty of conspiracy and unlawful taking of a marine mammal in violation of the MMPA (*U.S.A. v. Noel and Johnson* 2008). All five tribal members received judicial sentences based on the MMPA and the court's evaluation of the seriousness of their conduct. On May 14, 2008, the five tribal members entered into 1-year deferred prosecution agreements in tribal court (*Makah Tribe v. Theron Parker* 2008). No violations were reported to the tribal court during the term of the agreements, and the charges were subsequently dismissed 1 year later.

1.4.3 Other Environmental Assessments and Court Decisions Informing this Action

In 1996, we entered into an agreement with the Makah Tribe to ensure a United States request before the IWC to amend the Schedule's catch limit for the ENP gray whale stock and jointly manage the gray whale hunts. Before we could publish any quota for the Makah Tribe, we had to amend the WCA regulations, which only provided for aboriginal subsistence whaling by the Alaska Eskimo Whaling Commission. We conducted a NEPA analysis on our proposed rule to amend the regulations, and on March 26, 1996 issued a finding that the proposed regulations would not have a significant impact on the environment.

In 1996, the United States' request on behalf of the Makah Tribe to the IWC to revise the Schedule's catch limit for ENP gray whales met with resistance, and the United States withdrew the request. In June 1997, in response to concerns raised by some conservation organizations, we initiated a NEPA process to analyze the environmental impacts of a decision to publish an aboriginal subsistence whaling quota under the WCA for the Makah's use of up to five ENP gray whales annually. The draft EA was released for comment in August 1997. A few months later, we entered into a second agreement with the Makah Tribe. It was similar to the first, except that the second agreement included time and area restrictions aimed at reducing the likelihood of taking a

PCFG whale. We and the Makah entered into the agreement on October 13, 1997, and we issued the final EA and a Finding of No Significant Impact (FONSI) 4 days later.

Conservation groups challenged our FONSI in court, and the Ninth Circuit set aside the EA and FONSI in *Metcalf v. Daley* (2000) because we did not produce them until after entering into the agreement with the Tribe. With the court's invalidation of the EA and FONSI, we terminated the second agreement with the Makah Tribe and began a second NEPA process. On July 12, 2001, we issued a second EA and FONSI regarding a similar Makah whaling proposal. Conservation groups challenged that EA and FONSI in court, and the Ninth Circuit ruled in *Anderson v. Evans* (2004) that we should have prepared an EIS rather than an EA.

On March 6, 2003, we initiated an EIS to assess the environmental impacts of publishing the 2003 to 2007 quota for the Makah's use under the WCA (68 Fed. Reg. 10703). Because of pending litigation, we gave notice 2 years later that we were terminating the EIS (70 Fed. Reg. 49911, August 25, 2005). On August 25, 2005, we published a Notice of Intent (NOI) to prepare an EIS (70 Fed. Reg. 49911) and on February 27, 2006 (71 Fed. Reg. 9781), we announced in the Federal Register that we would expand the scope of the EIS to include the WCA. On May 9, 2008, we published a draft EIS evaluating the impacts on the human environment of the Tribe's proposed hunt and five alternatives.

Soon after releasing the 2008 draft EIS, several substantive scientific issues arose that required an extended period of consideration for our NEPA analysis, including: (1) potential bias in population estimates for ENP gray whales (Laake et al. 2009); (2) genetic evidence of population substructure indicating that PCFG whales may warrant consideration as a separate management unit (Frasier et al. 2011; Lang et al. 2011a); and (3) whale tracking and sampling data indicating that at least some members of the endangered western stock of gray whales migrate across the Pacific and into areas (including the Makah U&A) once thought to be used exclusively by ENP gray whales (see Subsection 3.4.3.2.1, WNP Seasonal Distribution, Migration, and Movements). This information is also under review at the IWC. Given these developments and the fact that it had been 7 years since the Tribe had submitted its initial request, on May 21, 2012, we announced we were terminating the 2008 DEIS and intended to prepare a new DEIS (77 Fed. Reg. 29967).

In making that announcement, we were mindful that we had received over 400 comments on the 2008 DEIS from state and federal entities, tribal governments, and both nonprofit organizations and interested individuals from the United States and around the world. The numerous comments we received covered topics ranging from specific biological, ecological, or legal issues to more general cultural, personal, or spiritual values. For example, a substantial number of the public comments were concerned with potential hunting impacts on PCFG whales, while others raised questions about issues of precedence on the world stage or the cultural significance of the hunt to the Makah Tribe. Many commenters covered multiple topics in a single letter, and topics often were repeated in multiple comments (although in different combinations). In some cases topics were outside the scope of the DEIS.

In developing the current DEIS, we carefully reviewed the comments on the 2008 DEIS and developed responses to those that provided new information or raised the most substantive issues. To capture that consideration, and aid reviewers of the current DEIS, we prepared a NMFS memorandum (NMFS 2015a) that lists the comments received on the 2008 DEIS (and either summarizes the comment or repeats the comment verbatim) and includes the draft responses to a number of comments that we considered while developing the current DEIS. The memorandum does not contain responses to each individual comment, given the large number of comments simply raising support or lack of support for a hunt, the significant overlap among the comments provided, and the fact that the 2008 DEIS was terminated. We have also reviewed the comments received on our May 21, 2012 *Federal Register* notice (77 Fed Reg. 29967) and responded to those in a separate scoping report (NMFS 2015b; refer to Appendix C).

1.5 Scoping and the Relevant Issues

1.5.1 Scoping Process

Prior to publishing the notice of withdrawal and intent to prepare a new EIS, we had conducted NMFS internal scoping in January and April 2012 to determine the most applicable approach to review under NEPA. We reviewed the resources and alternatives addressed in the 2008 DEIS and determined that most information was still applicable, some resources of the human environment could be eliminated from a new analysis (because updated information indicated that impacts were nonexistent or negligible), and at least one environmental resource (consideration of gray whales from the western North Pacific) should be added to the new analyses. We also determined it was appropriate to terminate the 2008 draft EIS and begin developing a new EIS that would include additional public scoping. We determined that doing so would be the best means to provide updated, high quality information to the public and to provide for related public involvement that would create a concise, current, and understandable record on the action and subsequent agency decision. With the announcement of our intention to prepare a new DEIS in the Federal Register (77 Fed. Reg. 29967, May 21, 2012), we opened a public scoping period and invited public comment.

Scoping is an open process that agencies must conduct under NEPA to determine the range and significance of the issues to be analyzed in depth in an EIS (40 CFR 1501.7). As part of the scoping process, agencies invite the participation of affected federal, state, and local agencies, Indian tribes, the proponent of the action, and other interested persons, all of whom help to identify relevant issues to address in the EIS, while helping the agency eliminate insignificant issues from detailed study. Scoping can also help determine the level of analysis and types of data needed.

The public comment period for preparation of the new EIS was open from May 21 until August 10, 2012. We received 11 comment letters and have addressed them in a separate scoping report (NMFS 2015b; refer to Appendix C). During internal NMFS and public scoping, we considered several sources of information to identify the concerns that should be addressed in this EIS, including but not limited to:

- The Makah Tribe's request
- Public comment during scoping for the 2008 DEIS
- The 2008 DEIS
- Public comment on the 2008 DEIS
- Public comment during scoping in 2012
- Input from other federal agencies (including the Bureau of Indian Affairs as NMFS' cooperating agency)
- IWC documents and deliberations
- The MMPA and its regulations
- The WCA and its regulations
- The Council on Environmental Quality's National Environmental Policy Act (NEPA) regulations (40 Code of Federal Regulations [CFR] 1500-1508)
- Other applicable statutes and regulations
- Other environmental reviews under NEPA
- Biological opinions under the ESA
- NMFS' stock assessment reports and other MMPA-related documents
- The Treaty of Neah Bay
- The federal trust responsibility

1.5.2 Concerns Identified During Scoping

The following concerns were identified during scoping. Detailed discussion of many of these concerns occurs throughout this document. Section 2, Alternatives, identifies and addresses concerns raised regarding alternatives analyzed and Appendix C summarizes our responses to comments raised.

1.5.2.1 Marine Habitat and Species

- Potential effects on marine habitat (such as kelp beds, surfgrass, intertidal area, or other habitat features)
- Potential effects of removing whales from the ecosystem

1.5.2.2 Gray Whales

- Potential effects on the ENP gray whale population of removing individual whales in the project area by hunting
- Threats to ENP gray whales throughout their range
- Potential effects on PCFG whales
- Potential effects on gray whale presence in the Makah U&A as a result of removing individual whales from the project area or from disturbing or frightening the whales in connection with hunting activities
- Potential effects on individual gray whales from specific hunting methods
- Potential effects on WNP whales that may be present in the project area during a hunt

1.5.2.3 Other Wildlife Species

- Potential effects on wildlife of noise
- Potential effects on wildlife of visual disturbance
- Potential effects on wildlife from fuel/contaminant spills
- Potential direct effects on wildlife from unintentionally striking animals with vessels or weapons
- Potential indirect effects on marine wildlife resulting from changes in prey availability because of the removal or redistribution of gray whales

1.5.2.4 Economics

- Potential economic effects on land-based, tourism-related businesses
- Short-term effects of tourism increase or decrease related to whale hunts
- Negative economic effect on the Tribe

- Long-term effects of whale hunting on county-wide and state-wide tourism
- Potential economic effects on water-dependent businesses
- Effects on Pacific coast whale-watching industry
- Effects on government spending
- Effects on international shipping and local commercial and recreational fisheries

1.5.2.5 Environmental Justice

- Potential disproportionate socioeconomic (employment and income) effects on minority and low-income populations
- Potential disproportionate sociological effects on minority and low-income populations

1.5.2.6 Social Environment

- Potential effects on attitudes and emotions, including spiritual beliefs
- Potential effects on human relations

1.5.2.7 Cultural Resources

- Potential effects on archaeological and historical sites or traditional cultural properties in the project area

1.5.2.8 Ceremonial and Subsistence Resources

- Potential effects on Makah ceremonial and subsistence practices from resuming whaling
- Potential effects on Makah ceremonial and subsistence practices from not being allowed to resume whaling

1.5.2.9 Noise

- Disturbance to human visitors in the immediate vicinity of hunting activities
- Disturbance to onshore communities or homes on the Makah Reservation

1.5.2.10 Aesthetics

- Visual effects on on-scene observers of the hunt
- Visual effects on off-site observers of the hunt through the media

1.5.2.11 Transportation

- Potential for the hunt and related activities to interfere with normal marine vessel traffic
- Potential for the hunt and related activities to interfere with normal aircraft traffic

- Potential for the hunt and related activities to interfere with normal highway traffic
- Potential for hunt and related traffic to cause accidents or disrupt essential emergency services transit

1.5.2.12 Public Services

- Potential for hunt-related activities to result in injuries or other emergency incidents that exceed the capacities of tribal and other local public health facilities
- Potential for hunt-related activities to affect and potentially overwhelm tribal, county, and Coast Guard law enforcement personnel and facilities
- Potential for hunt-related activities to detract from enforcement needed in other areas

1.5.2.13 Public Safety

- Potential effects on public and hunter safety related to possible methods of killing whales
- Potential effects on public and hunter safety from wounded whales
- Potential effects on public and hunter safety of prevailing weather and sea conditions
- Potential effects on public and hunter safety related to protest activities and conflicts

1.5.2.14 Human Health

- Potential positive health effects on tribal members and others consuming any whale products
- Potential negative effects from ingesting potential contaminants contained in freshly harvested and drift whale products

1.5.2.15 Concerns not Specifically Related to a Resource Area

- Precedential effect on the MMPA if take moratorium is waived (e.g., Would other tribes or organizations be able to obtain waivers more easily?)
- Precedential effect on whaling world-wide if a Makah hunt is authorized
- Effect on the Makah and other tribes associated with upholding or denying treaty rights
- International effect on the United States' position in international forums of denying an ethnic minority a subsistence right secured in a treaty
- Effect on management of special areas (such as the Olympic Coast National Marine Sanctuary or designated wilderness areas or marine sanctuary)
- The Makah Tribe's eligibility for an aboriginal subsistence whaling quota

1.6 Relationship to Other Treaties, Laws, Regulations, Policies, and Processes

Various authorities — both international and national (federal, state, and local) treaties, laws, regulations, policies, and processes — may apply to the whale hunting activities proposed by the Makah Tribe. While some of these authorities require specific agency action before any hunt, such as promulgation of regulations and issuance of permits, others require agency review and consultation. Table 1-2 lists those authorities that are most relevant to the Makah Tribe's proposed whale hunting.

Table 1-2. International, national, state, and tribal treaties, laws, regulations, policies, and processes that may be required for Makah whaling.

Authority	Oversight Body	Description of Authority, Necessary Action, or Review/Consultation
IWC Schedule, Paragraph 13 (Aboriginal Subsistence Whaling Catch Limits)	IWC and United States government	Sets catch limits by whale stock based on requests from contracting governments acting on behalf of aborigines (and informed by scientific advice). United States has submitted requests on behalf of the Makah.
Treaty of Neah Bay	United States government and NMFS	Establishes fishing, whaling, and sealing rights for the Makah. United States and NMFS must decide how best to meet their federal trust responsibilities.
MMPA	NMFS	Prohibits the take of marine mammals, subject to a waiver of the moratorium and/or compliance with a statutory exemption. Consistent with the 9th Circuit decision in *Anderson v. Evans* (2004) and in response to the Makah tribe's request to whale, NMFS must initially decide whether to waive the moratorium on take for the Makah's proposed whale hunting, proceed through formal rulemaking (including a possible on-the record hearing), and issue regulations and permits. In addition, a hunt may require incidental take authorization under the MMPA for any other marine mammals that could be incidentally taken.
WCA	NOAA Office of International Affairs and NMFS	Implements United States obligations under the ICRW. NMFS must decide whether to enter into a cooperative agreement with the Makah Tribe for co-management of the gray whale hunts and whether to publish an aboriginal subsistence whaling quota for the Makah's use.
NEPA	Council on Environmental Quality / EPA and NMFS	Requires that an EIS be prepared for every major federal action with the potential to significantly affect the quality of the human environment. Consistent with the 9th Circuit decision in *Anderson v. Evans,* NMFS is preparing this EIS and will eventually issue an ROD.
ESA	FWS/NMFS	Requires federal agencies to consult with the FWS or NMFS (depending on species jurisdiction) to ensure that activities authorized, funded, or carried out by federal agencies are not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. NMFS may consult internally and with FWS for the ESA-listed species and designated critical habitat in the project area.
Magnuson-Stevens Act	NMFS	Requires federal agencies to consult with NMFS with respect to any action authorized, funded, or undertaken (or proposed to be the same) when the action may adversely affect any essential fish habitat.
National Marine Sanctuary Act	NOAA National Ocean Service, National Marine Sanctuaries Program	Requires federal agencies to consult with NOAA when a proposed action internal or external to any sanctuary is likely to destroy, cause the loss of, or injure a sanctuary resource. NMFS will consult with Sanctuary staff.
Coastal Zone Management Act	Washington Department of Ecology (Ecology)	Requires federal agencies to ensure that activities carried out in or outside the state's coastal zone are consistent with the enforceable policies of approved state management plans, to the maximum extent practicable. NMFS may consult with Ecology.

Table 1-2. International, national, state, and tribal treaties, laws, regulations, policies, and processes that may be required for Makah whaling.

Authority	Oversight Body	Description of Authority, Necessary Action, or Review/Consultation
Migratory Bird Treaty Act and Executive Order 13186 (Migratory Birds)	FWS	Prohibits intentional and unintentional take of migratory birds. NMFS may consult with FWS.
Executive Order 12898 (Environmental Justice)	EPA	Provides for fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.
Executive Order 12996 (Management and General Public Use of the National Wildlife Refuge System)	Department of Interior	Establishes the mission of the National Wildlife Refuge System and guiding principles for the management and general public use of refuges.
Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments) and NOAA Administrative Order 218-8 (Policy on Government-to-Government Consultation with Federally Recognized Indian Tribes and Alaska Native Corporations)	DOC/NOAA	Requires federal agencies to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.
National Historic Preservation Act	Washington State Historic Preservation Officer (SHPO) and Tribal Historic Preservation Officer (THPO)	Requires federal agencies to consider cultural resources as part of all licensing, permitting, and funding decisions when the proposed action may have an effect on properties included in or eligible for the National Register of Historic Places. NMFS has assessed the potential impacts on registered historic sites in the project area and concludes that consultation is not necessary.
Clean Water Act	EPA; Washington Department of Ecology, and Makah Tribal Council	Establishes standards and regulations by which waters of the state must be managed. NMFS will provide this draft EIS to Ecology for its review.
Makah Whaling Permit	Makah Tribal Council and Makah Whaling Commission	Reviews whaling crew qualifications, identifies whaling crew and vessel participation, and provides other hunt restrictions. The Makah Tribal Council would issue the permit(s) to a whaling captain(s) before any hunt, based on recommendations from the Makah Whaling Commission.

1.7 Organization of this EIS

This EIS is organized in the following categories and sections:

- Executive Summary
- Acronyms and Abbreviations
- Glossary
- Table of Contents
- Section 1, Purpose and Need
- Section 2, Alternatives
- Section 3, Affected Environment
- Section 4, Environmental Consequences
- Section 5, Cumulative Effects
- References
- Distribution List
- List of Preparers and Agencies Consulted
- Index
- Appendices

Section 2

Alternatives

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2.0 ALTERNATIVES

2.1 Introduction

This section describes and compares the alternatives under consideration, including the Makah Tribe's proposed action. Figure 1-1 in Chapter 1 provides a map of the Tribe's U&A and the area within the U&A where the Tribe proposes to hunt gray whales (referred to in this EIS as "project area"). Subsection 2.2 describes our process for formulating alternatives. Subsection 2.3 describes the alternatives analyzed in detail in this EIS. Subsection 2.4 describes alternatives we considered but eliminated from detailed analysis, and Subsection 2.5 compares the way the alternatives analyzed in detail address the key concerns raised during scoping (described in Subsection 1.5.2, Concerns Identified During Scoping). The key concerns derived from internal NMFS and public scoping can be broadly categorized as:

- Conservation impacts (on gray whales and the local marine ecosystem)
- Impacts on the Makah Tribe
- Other impacts on the local human environment (such as public safety, aesthetics, public sentiment regarding whales, and tourism/whale-watching)

2.2 Alternative Development Process

We received the Makah's request for a waiver of the MMPA take moratorium in February of 2005. After reviewing the request, we concluded it contained relevant and appropriate information to warrant proceeding with a full evaluation. We completed an internal NMFS and public scoping process, identified alternatives, and released a DEIS in May of 2008 (NMFS 2008a). Besides the No-action Alternative and an alternative that reflected the Tribe's proposal, we evaluated four other alternatives that included variations on the area and timing of a hunt, and the limits on ENP and PCFG whales. We also described eight alternatives we considered but did not evaluate in detail. We received a number of comments on the DEIS, including comments on the alternatives, and have summarized our consideration of them in a NMFS memorandum (NMFS 2015a).

Subsequent to publishing the 2008 DEIS, we received new information that led us to terminate that process and begin the current EIS process (Subsection 1.4.3, Other Environmental Assessments and Court Decisions Informing this Action). Subsection 1.5, Scoping and the Relevant Issues, describes the issues developed during the 2012 scoping process. From the scoping process, we developed a full range of EIS alternatives.

The Council on Environmental Quality's regulations require that an agency consider and assess the environmental consequences of a No-action Alternative, the proposed action alternative, and other reasonable alternatives (40 CFR 1502.14). Reasonable alternatives, along with the proposed action and the No-action Alternative, must be rigorously explored and objectively evaluated in the EIS and presented in comparative form to define the issues and provide the decision-maker with a clear basis for choice among the options (40 CFR 1502.14). An agency preparing an EIS must, therefore, make a threshold determination of reasonableness when selecting alternatives from those identified during internal and public scoping. Alternatives that meet the reasonableness threshold are analyzed in detail in the EIS, while alternatives that do not meet this threshold are eliminated from detailed study.

The Council on Environmental Quality's regulations and guidance include general quantitative and qualitative factors to consider when evaluating reasonableness of alternatives. According to the Council on Environmental Quality's "40 Most Asked Questions" publication, the number of reasonable alternatives to analyze in detail depends on the nature of the case, but should cover a full spectrum of alternatives to the proposed action (46 Fed. Reg. 18026, 18027(1b), March 23, 1981). Qualitatively, reasonable alternatives include those alternatives that are practicable or feasible from a technical and economic standpoint and use common sense, rather than being simply desirable from the standpoint of the applicant (46 Fed. Reg. 18027(2a)). Reasonable alternatives may also be outside the legal jurisdiction of the lead agency (that is, may require legislative implementation) (46 Fed. Reg. 18027(2b)).

In developing the full range of action alternatives, we considered the principal components associated with a hunt (area, timing, and limits on striking and harvesting whales), as well as regulatory components of a hunt.

To assess the reasonableness of an alternative, we considered the potential of the alternative to meet the project's purpose and need. Subsection 1.3, Purpose and Need for Action, describes these as:

> <u>Purpose for Action</u> - The Makah Tribe's purpose is to resume its traditional hunting of gray whales under its treaty right. NMFS' purpose is to implement the laws that apply to the Tribe's request, including the Treaty of Neah Bay, MMPA, and WCA.
>
> <u>Need for Action</u> - The Makah Tribe's need for the action is to exercise its treaty whaling rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whaling traditions. NMFS'

> need for this action is to implement its federal trust responsibilities to the Makah Tribe with respect to the Tribe's reserved whaling rights under the Treaty of Neah Bay, and to comply with the requirements of the MMPA and the WCA. Under the MMPA, we must protect and conserve the gray whale population; under the WCA, we must regulate whaling in accordance with the ICRW and IWC regulations.

We also consider factors such as consistency with applicable law, practicability and feasibility, and the extent to which an alternative would identify and illuminate potential impacts or key concerns identified during scoping (Subsection 1.5.2, Concerns Identified During Scoping).

Subsection 2.3, Alternatives Considered for Detailed Study, describes the alternatives studied in detail in this EIS. Additional information about our assumptions and expectations regarding each alternative is discussed in Chapter 4, where we analyze the impacts of each alternative. Those alternatives we considered but eliminated from detailed study are described in Subsection 2.4, Alternatives Considered but Eliminated from Detailed Analysis.

2.3 Alternatives Considered for Detailed Study

This EIS analyzes six alternatives in detail—a No-action Alternative and five action alternatives (we have not identified a preferred alternative in this draft EIS). The five action alternatives would allow the Makah Tribe to conduct limited ceremonial and subsistence hunting of gray whales. One of the action alternatives (Alternative 2) reflects the Tribe's proposal. Alternative 3 (Offshore Hunt) differs from the Tribe's proposal in the area where hunting would be allowed and in the approach to managing impacts to the PCFG. Alternatives 4 (Summer/Fall Hunt) and 5 (Split-Season Hunt) have a different hunting season than the Tribe proposed, with the intention of avoiding impacts to WNP whales, and also have a different approach to managing impacts to the PCFG. Alternative 6 (Different Limits on Strikes and PCFG Mortality, and Limited Duration of Regulations and Permits) would have the same time and area as the Tribe's proposal, but a lower limit on strikes, a different approach to managing impacts to the PCFG, regulations that terminate in 10 years, and a limit of 3 years for permits. Table 2-1 compares the key elements of the six alternatives.

All action alternatives would include the following elements:

- MMPA waiver, regulations, and any necessary permits
- WCA quota publication and execution of a cooperative agreement
- Hunting of gray whales only (no other marine mammal would be harvested)
- No hunting of a whale calf or whale accompanied by a calf

- Certain restrictions on gray whale product use and distribution
- Certain public safety measures and enforcement
- Training, certification, and permit process for tribal whalers and whaling captain
- Makah Fisheries Management and NMFS hunt observers
- Tribal enforcement of tribal whaling ordinance, NMFS enforcement of federal regulations
- Monitoring of the hunt with adjustments
- Ongoing gray whale management and monitoring at the national and international levels
- Method of hunt

2.3.1 Alternative 1 (No Action)

The No-action Alternative would result in no authorized hunting of gray whales by the Makah Tribe. We would not waive the MMPA take moratorium, promulgate regulations, issue permits, publish a quota for the Makah under the WCA, or enter into a cooperative management agreement with the Makah Tribe for gray whale hunts. The IWC catch limit of 744 whales for the 6-year period beginning in 2013 would not change if we were to adopt the No-action Alternative. Under the No-action Alternative, no part of the catch limit would be allocated to the Makah Tribe, so the entire catch limit would be available for harvest by the Chukotka Natives. Examining the No-action Alternative will provide the public and NMFS with information about the following:

- Cultural and social impacts on the Makah Tribe if tribal members are unable to exercise their treaty right to hunt whales in the Tribe's U&A
- Conservation impacts on gray whales and the local marine ecosystem if no gray whales are hunted in the project area
- Social effects from no hunting, including economics, public safety, aesthetics, and public sentiment regarding whales
- Tourism/whale-watching effects if no gray whales are hunted in the project area

Table 2-1. Primary Differences Among Alternatives.

Whale Hunting Components		Alternatives: 1 No-action	2 Tribe's Proposed Action	3 Offshore Hunt	4 Summer/Fall Hunt	5 Split Season Hunt	6 Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits
Hunt timing		None	December 1 through May 31	Same as Alternative 2	June 1 through November 30	December 1 through December 21; May 10 through May 31	Same as Alternatives 2 and 3
Hunt area		None	U&A west of Bonilla-Tatoosh line; no whale may be struck within 200 yards (183 m) of Tatoosh Island or White Rock during the month of May	Same as Alternative 2, except at least 5 miles (8 km) from shore	Same as Alternative 2, except no whale may be struck within 200 yards (183 m) of Tatoosh Island or White Rock during any month	Same as Alternative 2	Same as Alternatives 2 and 5
Maximum limit for harvested, struck, and struck and lost whales	Annual	0	Up to 5 harvested, 7 struck, and 3 struck and lost	Up to 5 harvested, 6 struck, and 2 struck and lost	Up to 5 harvested, 7 struck, and 3 struck and lost; harvest, struck, and struck and lost limited by PCFG limit (see below)	Up to 5 harvested; struck and struck and lost limited by PCFG limit (see below)	Up to 4 harvested (7 over 2 years); up to 4 struck (7 over 2 years); struck and lost limited by strike limit or PCFG limit (see below)
	6-year	0	Up to 24 harvested, 42 struck, and 18 struck and lost	Up to 24 harvested, 36 struck, and 12 struck and lost	Up to 24 harvested, 42 struck, and 18 struck and lost; harvest, struck, and struck and lost limited by PCFG limit (see below)	Up to 24 harvested; struck and struck and lost limited by PCFG limit (see below)	Up to 21 harvested, 21 struck; struck and lost limit dictated by PCFG limit (see below)
Additional limits on harvest or mortality of PCFG whales. Estimated limits are based on current conditions and could change based on updated information. The descriptions in the table are summaries. Please refer to the narrative for full details, and Subsection 3.4.2.1.3, for background on the potential biological removal (PBR) approach.		N/A	Tribe's bycatch proposal (apply PBR-based formula, with Rmax of 4% and Recovery Factor same as for ENP (1.0) and Nmin of OR-SVI) results in about 3.0 whales/year; struck but not landed do not count as PCFG; no carry-over of unused limit	Total mortality limit set at PBR (as reported in NMFS' stock assessment report); additional female mortality limit set based on proportion of females in PCFG (results in about 2.7 males and 1.6 females); all struck but not landed count as PCFG whales in proportion to presence of PCFG whales; no carry-over of unused limit	Mortality limit set to achieve or maintain 80% of carrying capacity (PBR-based formula with recovery factor of 0.35), minus other human-caused mortality (results in 1 whale); approach only known ENP males; all strikes count as PCFG; no carry-over of unused limit unless it's between 0.5 and 1.0	Mortality limit set at 10% of PBR (results in about 1 whale/4 years); struck but not landed count as PCFG in proportion to presence of PCFG whales; carry-over of unused limit used to calculate hunt hiatus	Mortality limit set at PBR minus other human-caused mortality (results in about 2 whales/year); all struck but not landed count as PCFG in proportion to presence of PCFG whales; no carry-over of unused limit
Waiver and permit duration and additional regulations		N/A	Unlimited waiver period; up to 5-year permits; no additional regulations	Same as Alternative 2	Same as Alternatives 2 and 3	Same as Alternatives 2, 3, and 4	Waiver period ends after 10 years; 3-year permits

2.3.2 Alternative 2 (Tribe's Proposed Action)

This description of the Makah Tribe's proposed action is based on the Tribe's February 2005 MMPA waiver request. In its request the Tribe referred to a whale management plan adopted in 1998 and revised in 2001 to govern future proposed whale hunts. The Tribe's waiver request includes a proposal that NMFS issue regulations with provisions similar to those contained in the 2001 Gray Whale Management Plan. In addition, in 2013 the Tribal Council adopted an ordinance governing whaling by tribal members. This ordinance supersedes all prior management plans. The waiver request and the 2001 management plan are provided as Appendix A to this EIS. The Tribe's 2013 whaling ordinance is provided as Appendix B. In its MMPA waiver request, the Tribe proposed to abide by the specific conditions described below.

In the following description of Alternative 2, several elements would be common to all of the action alternatives. We indicate these with the parenthetical phrase "Common among Action Alternatives."

2.3.2.1 Regulatory Actions Requested of NMFS

The Makah Tribe requested authorization to hunt ENP gray whales in the coastal portion of its U&A (that is, excluding the Strait of Juan de Fuca) (Figure 1-1). Whaling is a right expressly secured in the 1855 Treaty of Neah Bay. Pursuant to the court's decision in *Anderson v. Evans* (2004), to hunt whales, the Makah Tribe seeks domestic authorization from NMFS under two statutory authorities—the MMPA and the WCA.

Specifically, we would have to authorize any Makah whaling by (1) waiving the moratorium prohibiting take of marine mammals under subsection 101(a)(3)(A) of the MMPA with respect to any marine mammal stock to be taken by the Tribe, (2) promulgating regulations to implement the waiver and govern the hunts in accordance with subsection 103 of the MMPA, (3) issuing any necessary permits to the Makah under subsection 104 of the MMPA, and (4) entering into a cooperative agreement for co-management of the hunt and publishing any relevant aboriginal subsistence whaling quotas under the provisions of the WCA (see Subsection 1.2.3, Marine Mammal Protection Act, and Subsection 1.2.4, Whaling Convention Act, for a discussion of those statutes).

2.3.2.2 Gray Whale Hunt Details

2.3.2.2.1 <u>Species (Common among Action Alternatives)</u>

The Makah Tribe requested a waiver of the take moratorium for ENP gray whales only. As noted in Subsection 1.1.3, Summary of Gray Whale Status, we currently do not recognize the PCFG as a separate stock, but have stated that it "appears to be a distinct feeding aggregation and may warrant consideration as a distinct stock in the future" (Carretta et al. 2014). The Tribe's request included separate consideration for PCFG whales, but did not request a waiver of the take moratorium for PCFG whales (as they were not designated as a separate population stock at the time of the request). Other marine mammals occur in the Makah U&A, including WNP whales, which are likely present during January through May (Subsection 1.1.3, Summary of Gray Whale Status; Subsection 3.4.3.2, Western North Pacific Gray Whales). The Tribe has not requested a waiver of the take moratorium for WNP whales. No other species are included in the Tribe's waiver request; thus, the EIS does not analyze their intentional take (though it does consider the potential that other species could be affected by a hunt for gray whales). In this EIS, we define these entities as follows:

Western North Pacific (WNP) gray whales = Gray whales that feed during the summer and fall in the Okhotsk Sea (primarily off northeast Sakhalin Island, Russia), some of which also feed off southeastern Kamchatka in the Bering Sea.

Eastern North Pacific (ENP) gray whales = Gray whales that feed during the summer and fall primarily in the Chukchi, Beaufort, and northwestern Bering Seas, but also as far south as California.

PCFG whales = Gray whales observed in at least 2 years between June 1 and November 30 in the PCFG area (along the U.S. and Canada coasts between 41°N and 52°N, excluding areas in Puget Sound) and entered into the Cascadia Research Collective's photo-identification catalog. For purposes of determining whether a harvested whale is a PCFG whale and therefore counts against a bycatch or mortality limit, the Tribe's proposal under Alternative 2 would include cataloged whales seen in at least 1 year, while the other action alternatives would include cataloged whales seen in 2 or more years or at least once in the past 4 years.[1]

2.3.2.2.2 Numbers of Whales Harvested (Annual and 6-year)

The Tribe proposes to limit the number of ENP gray whales that may be harvested to no more than five whales in any calendar year and no more than 24 whales in any 6-year period, consistent with the catch limit set by the IWC. (The Tribe originally requested a 5-year limit of 20 whales, consistent with the IWC limit at the time of the original request. The IWC now sets 6-year rather than 5-year catch limits; thus, this EIS analyzes the 6-year limit.)

We use the term "harvest" in this EIS to mean attaching a flag or buoy to a whale, making a whale fast to a vessel, or landing a whale (Subsection 1.1.1, Summary of the Proposed Action). Thus, a whale may be counted as harvested even if not landed. This meaning is consistent with the IWC

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[1] The accounting used for Alternatives 3-6 is based on sighting data indicating that newly seen whales that recruit to the PCFG generally do so within 4 years of their first sighting (see Subsection 3.4.3.4.1, PCFG Population Structure; Jeff Laake, NMFS, personal communication, April 1, 2014).

regulations, which set 'catch limits' for aboriginal subsistence whaling and count all "takes" as "catches." IWC regulations define "take" as "to flag, buoy, or make fast to a whale catcher" (IWC Schedule 2012, paragraph (1)(c)). In contrast, the MMPA defines take as to "harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill" (16 United States Code [USC] 1362(13)). Many whale hunting activities that the Makah propose (i.e., pursuing, approaching, striking, and killing) are "takes" under the MMPA but not the IWC regulations (for example, pursuing and approaching a whale are not activities expressly noted in the IWC regulations).

The Tribe also proposes to limit the number of harvested whales further, if necessary to meet international treaty obligations of the United States under the ICRW, or to prevent the abundance of the ENP gray whale stock from falling below its OSP level (Subsection 3.4.2.1, Marine Mammal Protection Act Management, explains the OSP concept).

2.3.2.2.3 Limits on Harvesting PCFG Whales

The Makah Tribe's proposed action contains two conservation measures related to PCFG whales "to ensure that gray whales remain a functioning element of the ecosystem" (Makah Tribe 2005). The measures would (1) restrict the time and area of any hunt to reduce the likelihood that a PCFG whale would be killed (discussed in Subsection 2.3.2.2.8, Location of Hunt (Area Restrictions), and Subsection 2.3.2.2.9, Timing of Hunt (Seasonal Restrictions)) and (2) cease the hunt if a predetermined number of PCFG whales were landed and identified. The Tribe refers to this limit on PCFG whales as an "allowable bycatch limit." Here we use the term "allowable bycatch limit" to refer to the Tribe's proposed limit on landed and identified PCFG whales. In contrast, other alternatives focus on all hunt-related mortality (whales that are struck and lost as well as whales that are landed) and use the term "PCFG mortality limit" to refer to limits on all hunt-related PCFG mortality.

The Makah Tribe's waiver request states that the Makah Fisheries Management observers (Subsection 2.3.3.2.7, Other Environmental Protection Measures, Makah Fisheries Management Department and NMFS Observers and Monitoring) would photograph any whale landed and provide the photographs to NMFS to compare with the PCFG photographic database.[2] This would allow NMFS and the Tribe to determine if any landed whale was a PCFG whale.

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[2] Cascadia Research Collective currently manages the only available photographic database for ENP gray whales, and also has expertise to determine matches (Subsection 3.4.3.3.1, ENP Seasonal Distribution, Migration, and Movements). If regulations were adopted in conjunction with a waiver of the take moratorium, the regulations would need to identify a procedure for approving a database and a process for determining matches.

Under the Tribe's proposal, whales struck but not landed would not count against the allowable bycatch limit of PCFG whales. The Tribe proposes to stop hunting when a predetermined number of cataloged whales (sighted at least once in the PCFG range from June 1 through November 30) are landed. That number would be established using a formula based on the one NMFS uses to set the level of human-caused mortality that allows marine mammal population stocks to achieve or maintain their OSP level. That formula contains three parameters: (1) maximum net productivity rate, (2) minimum abundance, and (3) a recovery factor. The MMPA refers to the result of this formula as the "potential biological removal" or PBR level (see Subsection 3.4.2.1.3, Linking Marine Mammal Population Parameters to Removals). Where we have sufficient information, we report PBR levels for each recognized marine mammal stock in our stock assessment reports. We have also developed guidelines for determining the values in this formula in setting PBR (NMFS 2005b). Subsection 3.4.2.1, Marine Mammal Protection Act Management, describes the formula in greater detail and the agency guidelines for its use.

To establish an allowable bycatch limit, the Tribe proposes to use a 4 percent maximum net productivity rate (consistent with the IWC analysis of the Tribe's hunt; Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates, and Subsection 4.1.2.3, Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested) and the same recovery factor (currently 1.0) that NMFS uses to calculate PBR for the ENP stock as a whole. Instead of using the entire PCFG to set the minimum abundance value in the formula, however, the Tribe also proposes to use a subset of the PCFG, which is only those PCFG whales identified from Oregon to Southern Vancouver Island. Under current conditions, the Tribe's proposed method would result in an allowable bycatch limit of about 3.0 PCFG whales per year (Subsection 4.1.2, Alternative 2, describes the application and result of the Tribe's proposed method).

There are a number of variations on how the basic formula described above could be used to set a PCFG mortality limit, depending on the management goal. For example, in our most recent stock assessment report for gray whales, we calculate a PBR level for the PCFG using a more recent maximum productivity value of 6.2 percent, different values for minimum abundance (based on abundance in the PCFG range from northern California to northern British Columbia), and a recovery factor of 0.5. The action alternatives in this EIS explore the effect of using various values for the parameters in the formula to set a PCFG mortality limit.

There are also methods of counting whales against a management limit other than the method proposed by the Tribe. The Tribe proposes to count only those whales that are landed and photographically identified as PCFG whales. This method does not account for all PCFG whales potentially killed in a tribal hunt, however, because PCFG whales may be struck and killed but not landed and identified. Accounting methods could include counting all struck whales as PCFG whales, or some proportion of struck whales as PCFG whales. Alternatives 3 through 6 explore different methods of setting a PCFG mortality limit and accounting for whales that are struck but not landed. Also, Alternatives 3 through 6 differ from the Tribe's proposed action in that the PCFG mortality limit would be based on cataloged whales seen in 2 or more years or at least once in the past 4 years. This is consistent with the latest PCFG definition by the IWC Scientific Committee (which is based on sightings in 2 or more years), but also takes into account the fact that most whales sighted in multiple years are typically seen twice within the first 4 years following their initial sighting.

Finally, the Tribe does not propose to account for other sources of human-caused mortality when setting the allowable bycatch limit for PCFG whales. In its comments on the 2008 DEIS, the Marine Mammal Commission questioned this approach. Alternatives 4 and 6 therefore explore the effects of setting a PCFG mortality limit in a Makah hunt that takes into account other sources of human-caused mortality.

2.3.2.2.4 Number of Whales Struck (Annual and 6-year)

The Makah Tribe would limit the number of ENP gray whales that may be struck to no more than seven whales in any calendar year and no more than 42 whales in any 6-year period. Consistent with the IWC Schedule, the Tribe defines "strike" in their request as "any blow or blows delivered to a whale by a harpoon, rifle, or other weapon which may result in death to a whale, including harpoon blows if the harpoon is embedded in the whale, and rifle shots that hit a whale."

The IWC Schedule defines "strike" as meaning "to penetrate with a weapon used for whaling." The WCA implementing regulations define "strike" as "hitting a whale with a harpoon, lance, or explosive device" (50 CFR §230.2). Subsection 916k of the WCA provides that regulations of the IWC are "effective with respect to all persons and vessels subject to the jurisdiction of the United States." For purposes of analyzing the Tribe's request, we therefore interpret the WCA definition of "strike" to be consistent with the IWC Schedule. The Tribe also proposes to limit the number of whales struck to further meet the ICRW obligations of the United States, or to prevent the ENP gray whale stock abundance from falling below its OSP level.

2.3.2.2.5 Number of Whales Struck and Lost (Annual and 6-year)

Whales that are known to be struck, but not flagged, buoyed, or secured to the vessel, are considered to be "struck and lost." The Tribe proposes to restrict the number of struck and lost whales to no more than three whales in any calendar year and no more than 18 whales in any 6-year period. These numbers are included in the numbers for annual and 6-year proposed strikes (i.e., three struck and lost whales per year is part of the seven-whale strike limit per year, and not additive). The IWC schedule does not contain a limit to the number of strikes for gray whales. If the struck and lost quota is met or exceeded, the Tribe proposes to stop hunting to allow the opportunity to reevaluate techniques and address potential problems.

2.3.2.2.6 Whales Approached and Subjected to Unsuccessful Strike Attempts

Whales not harvested or struck may nevertheless be disturbed by Makah hunters. In its application, the Tribe referred to its experience in 1999 and 2000 to estimate there would be four unsuccessful harpoon attempts for each successful strike, and 20 whales approached for each successful strike. Based on our review of the available data from the 1999 and 2000 hunts, and in particular the reports of the 1999 (Gosho 1999) and 2000 (Gearin and Gosho 2000) hunts, we have developed different estimates for this analysis.

The Tribe's application states that, based on experience with whale hunts in 1999 and 2000, there would be 10 approaches for each whale struck. The Tribe estimated that with 10 approaches for each whale struck there would be 20 whales approached, because of the average pod size of two whales, as observed during the southbound counts at Granite Canyon.

To estimate the potential number of unsuccessful harpoon attempts for the action alternatives, we considered the Tribe's hunt experience from both 1999 and 2000. In 1999, tribal hunters made three unsuccessful harpoon attempts and one successful strike. Based on this information, the Tribe's application concluded there would be four unsuccessful harpoon attempts for each successful strike. However, the actual ratio experienced in the 1999 hunt was 3:1, not 4:1, because the fourth attempt was successful. The Tribe also hunted in 2000 and made three unsuccessful harpoon attempts and no successful strikes. Thus, the ratio of unsuccessful harpoon attempts to successful strikes from the combined 1999 and 2000 hunting seasons would be 6:1. This is the ratio we use to estimate the number of unsuccessful harpoon attempts.

2.3.2.2.7 Age and Reproductive Status (Common among Action Alternatives)

The Tribe proposes to prohibit the striking of a whale calf or any whale accompanied by a calf. Gray whale calves generally accompany adult female parents during migration and may be observed as pairs of traveling whales.

2.3.2.2.8 Location of Hunt (Area Restrictions)

The area where the Makah Tribe proposes to hunt is confined to its U&A west of the Bonilla-Tatoosh line, excluding the Strait of Juan de Fuca. WAC 220-16-490 defines the Bonilla-Tatoosh Line as a line projected from the most westerly point on Cape Flattery to the lighthouse on Tatoosh Island, then to the buoy adjacent to Duntz Rock, then to Bonilla Point on Vancouver Island. The Tribe's U&A, as adjudicated in *United States v. Washington* (1974 and 1985), also excludes grounds that the Makah historically hunted and fished, but that are now beyond the exclusive economic zone (EEZ), which is also the boundary between Canada and the United States. According to the Tribe's waiver request, restricting the hunt to the area of its U&A outside the Strait of Juan de Fuca, in conjunction with the proposed seasonal restrictions (Subsection 2.3.2.2.9, Timing of Hunt (Seasonal Restrictions)), is designed to minimize the potential for killing PCFG whales. Also, to address concerns about impacts to nesting seabirds, under the Tribe's proposal no whale may be struck within 200 yards (183 meters) of Tatoosh Island or White Rock during the month of May. Alternative 4 (Summer/Fall Hunt) would have the same 200-yard (183-meter) provision, but it would apply to all months. Alternative 3 (Offshore Hunt) would differ from all other action alternatives by constraining the hunt location to areas farther than 5 miles (8 km) offshore of the Tribe's U&A area outside the Strait of Juan de Fuca.

2.3.2.2.9 Timing of Hunt (Seasonal Restrictions)

The Makah's waiver request includes timing restrictions that would prohibit hunting from June 1 to November 30 in any calendar year. According to the Tribe's waiver request, this measure is "designed to avoid any intentional harvest of gray whales" that have been identified within the PCFG survey area by hunting outside of times that coincide with the summer feeding period.

2.3.2.2.10 Proposed Hunting Method

The Makah Tribe plans to use both traditional and modern methods for hunting whales to balance the preservation of traditional cultural methods with safety and the need for increased hunting efficiency. Traditional and modern methods are relative terms because, as discussed in Subsection 3.9, Cultural Resources, the Tribe has adopted technological innovations over time. The Tribe considers traditional methods to be those that would be maintained based on their contribution to the ceremonial value of whaling. The Tribe's request includes the use of modern equipment when needed for safety, increased technological effectiveness, and/or to meet MMPA permit requirements.

The proposed method includes hunting whales from one or two sea-going canoes that are at least 30 feet (9 meters) long and carved by the Makah. Each canoe would be manned by an eight-person whaling crew (all Makah tribal members) and would include a harpooner and paddlers. One or more chase boats would accompany the canoes and either the canoe or chase boat would carry the whaling captain. Each chase boat would be manned by a pilot, diver, rifleman, backup harpooner, and at least one other crew member serving as a safety officer. Each chase boat would be equipped with a navigation system capable of fixing the vessel's position on the water. If neither chase boat had an engine capable of safely towing an adult gray whale to shore, there would be an additional vessel with that capability.

All action alternatives involve the same hunting method as proposed by the Tribe, except Alternative 3, which would involve only motorized vessels and not a canoe.

Method of Striking and Killing

The harpooner would use stainless steel harpoons with a toggle point. Each harpoon would be secured to a rope with float(s) attached. The harpooner would use one or more harpoons to make the first strike on the gray whale. If a harpoon strikes and affixes the toggle point and floats to the whale with the harpoon line attached, the rifleman in the chase boat would shoot it at close range with a high-powered, .50-caliber rifle with the intent of killing the whale with a shot to its central nervous system. A diver would attempt to sew the dead whale's mouth shut to prevent the whale from sinking.

Optional Methods of Striking and Killing

Although the Tribe proposed a specific method of striking and killing whales, public comments and our review of available information led us to consider additional methods. Under Alternative 3, Offshore Hunt, we consider the use of a .577 caliber rifle as the killing weapon instead of a .50 caliber rifle. We describe the rationale for including this particular weapon in more detail under Alternative 3 below (Subsection 2.3.3, Offshore Hunt). For all other action alternatives, we consider the use of a darting gun that fires an explosive projectile into the whale. The hand-thrown darting gun consists of a barrel (to hold an explosive projectile) that is attached to a wooden shaft equipped with a toggle-point harpoon. The harpoon is intended to penetrate the whale and attach a line and float to secure the whale and assist in its recovery (O'Hara et al. 1999; Øen 2000; IWC 2007a). The barrel contains a trigger rod that ignites a propellant or "pusher" charge. This pusher charge fires the explosive projectile into the whale's body. The explosive projectile has a time delay fuse. The explosive projectile may be either black powder or penthrite and is intended to kill when it explodes inside the whale, either through shrapnel or blast injury. The cervical and cranial thoracic regions are the critical targets for the darting gun projectile (O'Hara et al. 1999). If the initial darting gun projectile (primary strike) fails to kill the whale, the whale would be killed with additional explosive grenades delivered using either a smooth-bore, eight-gauge shoulder gun or a darting gun.

It would be reasonable to use the darting gun as an optional method of striking and killing whales regardless of the action alternative. For this reason, although other options for striking and killing are not part of the Tribe's proposal, this EIS examines this optional method as an element common among all action alternatives, including the proposed action. Impacts on individual whales from each of the optional hunting methods are described in further detail in Subsection 3.4.3.5, Welfare of Individual Whales.

Securing and Towing the Whale

Following a successful kill, the whaling crew would secure the whale with a line to tow it to a beach (mostly likely on the Makah Reservation), where tribal members could participate in celebrations and butchering, and tribal and/or NMFS biologists would measure and photograph the whale and take samples of tissues. Most of the whale products from the beached whale would be removed within 24 hours, including tissue samples collected by biologists.

The Tribe proposes to conduct research and development to refine whaling vessels, equipment, and hunting methods in consultation with NMFS to improve the safety, effectiveness, and humaneness of the gray whale hunt.

2.3.2.2.11 Whale Product Use and Distribution (Common among Action Alternatives)

Limited Commercial Use and Distribution

The Makah Tribe would not sell or offer for sale whale products to the extent prohibited in WCA regulations. These regulations prohibit any person from selling or offering for sale whale products taken from an aboriginal subsistence hunt, except for authentic articles of native handicraft (which includes clothing) (50 CFR 230.4(f)). MMPA subsection 102(f) prohibits take of whales incidental to commercial whaling. Although subsection 101(b) of the MMPA allows Alaska Natives to sell edible whale products in native villages and towns in Alaska or for native consumption, the Makah would not sell or offer for sale any edible whale products. Any sales or offers to sell would be limited to non-edible whale products used to create authentic articles of native handicraft within the United States.

The Makah Tribe’s whaling ordinance would prohibit tribal members who participate in any whale hunt from receiving monetary compensation, also in accordance with WCA regulations (50 CFR 230.4(e)).

Non-Commercial Use and Distribution

The Makah, within the borders of the United States, would be able to share edible whale products from any hunt under certain limited circumstances.

2.3.2.2.12 Other Environmental Protection Measures

Seabirds

Tatoosh Island and White Rock (which are located within the coastal portion of the Makah's U&A) support large seabird breeding colonies (Subsection 3.5.3.2.2, Non-Listed Birds and Their Associated Habitats). The Tribe proposes to avoid striking whales within 200 yards (183 meters) of Tatoosh Island and White Rock during May to minimize disturbance to feeding and nesting seabirds. The Tribe's additional proposal to prohibit hunting from June 1 through November 30 to protect PCFG whales would also help protect seabird breeding colonies. This provision is incorporated into all action alternatives, except under Alternative 3, which restricts hunting to the area beyond 5 miles (8 km) from shore, well beyond Tatoosh Island and White Rock.

Public Safety Measures and Enforcement (Common among Action Alternatives)

The Tribe proposes to implement public safety measures at least as restrictive as those described in its 2001 Gray Whale Management Plan (Appendix A). Those measures include the public safety measures the Makah Tribe previously employed in the 1999 and 2000 hunts, as well as additional measures that the Tribe plans to use for future whale hunts. The measures (described in more detail in Subsection 3.15, Public Safety, and in the Tribe's Whaling Ordinance, Appendix B) proposed by the Tribe include the following:

The Makah Tribe whalers would use modern methods to kill a whale quickly; this would reduce the potential for a wounded whale to injure hunters or people in other vessels.

All whalers would participate in whaler safety training, and drug and alcohol testing (see Training and Certification Process for Tribal Whalers, below).

The whaling captain would also participate in captain training and certification. The captain would be responsible for the safety of his crew.

Riflemen and/or whalers in charge of firing explosive charges would participate in training for proficient and accurate shooting under simulated hunt conditions.

The rifleman or whaler in charge of firing explosive charges on board the chase boat would not be able to discharge his weapon until authorized to fire by a safety officer designated by the whaling captain. If a rifle were used, the safety officer would not authorize the discharge of the rifle unless the barrel of the rifle were above and within 30 feet (9 meters) of the target area of the whale, and the rifleman's field of view were clear of all persons, vessels, buildings, vehicles, highways, and other objects or structures that if hit by a rifle shot could injure humans or property.

The whaling captain would suspend the hunt if visibility were less than 500 yards (457 meters) in any direction.

The whaling canoe would have additional support boats available to provide first aid to whalers and help secure and tow the whale.

All whaling equipment would be inspected before whaling.

The Coast Guard would enforce the provisions of its permanent regulated navigation area (RNA) and moving exclusionary zone (MEZ), which would minimize the chance of bystanders accidentally being harmed during a hunt.

The Tribe further proposes to comply with additional safety measures that may be indicated as a result of this NEPA review.

Training and Certification Process for Tribal Whalers (Common among Action Alternatives)

The Tribe proposes that if a hunt were authorized, it would require all tribal members who engage in whaling to be under the control of a whaling captain holding a valid whaling permit (also referred to as a license) issued by the Makah Tribal Council (see Subsection 1.2.4.2, National Whaling Governance under the WCA, for an explanation of responsibilities held by Native American whaling organizations). Whaling permits issued by the Council would incorporate and require compliance with all NMFS requirements, as well as tribal regulations. The regulations would also provide a training and certification process for all members who participate in whaling, as required by NMFS' WCA implementing regulations. Whaling team members may also partake in spiritual preparations.

The Makah Tribal Council would not issue a permit to a whaling captain unless it determined that the whaling captain and each whaling team member had been certified by the Makah Whaling Commission or Makah Fisheries Management Department to perform his assigned role on the whaling crew.

Makah Fisheries Management Department and NMFS Observers and Monitoring (Common among Action Alternatives)

The Makah Tribe's waiver request includes accommodations for both a Makah Fisheries Management Department observer and a NMFS observer to accompany the whaling team in the chase boat(s). The Tribe would provide the designated NMFS observer with at least 24-hour notice of whaling permit issuance to the whaling captain by the Makah Tribal Council, unless the NMFS observer was already present on the Makah Reservation. The Tribe's request also indicates that the NMFS observer could collect samples from landed whales. This would include stomach contents, ovaries (as applicable), ear plugs, baleen plates, and other tissue samples. The Makah Fisheries

Management Department would photograph all landed whales, and the Department's observer would be responsible for recording the time, date, location, and physical characteristics of each whale struck and, for each whale harvested, the body length, fluke width, sex, any fetus found in a landed whale, and the time to death for all whales harvested. The Tribe would have to report all monitoring data to NMFS annually.

Enforcement (Common among Action Alternatives)

Tribal regulations would include provisions requiring tribal enforcement of the regulations and permit terms and conditions NMFS adopted, if hunting were authorized. These regulations would include criminal sanctions, such as fines and imprisonment, up to the limits imposed by the Indian Civil Rights Act. Violators may also be barred from exercising treaty fishing, hunting, and/or whaling rights for a minimum of 3 years.

Makah Department of Natural Resources Enforcement has been designated as the tribal law enforcement agency responsible for administering the requirements of whaling regulations and permits. A whaling captain would be liable for any violations committed by a member of the whaling team under his control.

In the event of violations of NMFS' regulations governing any authorized hunt, federal enforcement would also be possible. Potential offenses could include violation of the WCA and MMPA and any implementing regulations.

2.3.3 Alternative 3 (Offshore Hunt)

Alternative 3 would have the same conditions as Alternative 2 regarding numbers of ENP whales struck, struck and lost, and harvested; seasonal restrictions; and regulatory conditions. Alternative 3 would also have the same hunt area as Alternative 2, except that it would require the use of a .577 caliber rifle and would prohibit Makah hunters from making an initial strike on a gray whale within 5 miles (8 km) of shore. (Makah hunters and chase boats may nevertheless have to follow any struck whale trailing harpoon lines to dispatch it, regardless of distance to shore.) To allow full consideration of different hunt methods, Alternative 3 also assumes an all-motorized hunt, with no use of a canoe.

Under Alternative 3, the Tribe would hunt from two or more motorized vessels, one manned by a pilot and the primary harpooner, and the other manned by a pilot, rifleman, harpooner, and at least one other crew member serving as a safety officer. One of the vessels would be at least 24 feet (7.3 meters) long and powered by an engine capable of safely towing an adult gray whale to shore. Each motorized vessel would be equipped with a navigation system capable of fixing the vessel's position on the water.

Alternative 3 would also differ from Alternative 2 in its approach to managing impacts to the PCFG. It would set an annual total mortality limit for PCFG whales equal to PBR, with an additional annual mortality limit for female PCFG whales equal to one-half PBR, using the PBR as applied to PCFG whales in NMFS' most recent stock assessment report (currently Carretta et al. 2014)[3]. Under present circumstances, this calculation would result in an annual mortality limit of approximately 2.7 PCFG whales total, with an additional limit of approximately 1.6 female PCFG whales. (Subsection 4.1.3, Alternative 3, describes in more detail how the limit would be calculated.)

The offshore hunt area under Alternative 3 is intended to address several issues raised in public comments on the 2008 DEIS and during the 2012 scoping process, including: the potential for bullets from a rifle to injure persons on shore; the potential for a hunt close to shore to affect aesthetic, cultural, and other social and economic resources; the potential for hunt activities to disturb wildlife on the rocks and islands of the Washington Islands National Wildlife Refuge; and the potential for an offshore hunt to be less likely to kill a PCFG whale (because PCFG whales may concentrate closer to shore and migrating whales may be farther offshore). The .577 caliber rifle would be expected to have a shorter range than the .50 caliber rifle (Subsection 3.4.3.5.4 Method of Killing and Time to Death, Rifle as the Killing Weapon), so it is reasonable to include that rifle as a component of Alternative 3 that is intended to mitigate risks on shore from gunshots.

Alternative 3 also responds to key concerns that we should consider different mortality limits for males and females. A lower limit on female whales would limit impacts on reproduction within the PCFG and would also limit impacts on the recruitment of new PCFG members, because some PCFG whales are known to recruit to the group by accompanying their mothers to the area as calves (Subsection 3.4.3.4.1, PCFG Population Structure, PCFG Genetics and Recruitment).

2.3.4 Alternative 4 (Summer/Fall Hunt)

Alternative 4 would have the same conditions as Alternative 2 except the hunting season would be from June 1 through November 30, to avoid killing a WNP whale (because such whales would be feeding in the WNP at this time and not present in the Makah U&A). This alternative responds to key concerns that a tribal hunt should be managed to avoid WNP whales. Because hunting would be allowed during the period that defines membership in the PCFG, Alternative 4 would also include restrictions specifically intended to manage impacts to the PCFG:

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[3] It is possible that future stock assessment reports could discontinue reporting values for PCFG whales. In that case, NMFS would base these calculations on an alternative source(s) for the best available scientific information regarding PCFG whales.

1. Hunters could only approach a whale identified as an ENP male by a trained onboard observer. Avoiding female whales in a tribal hunt would limit impacts on reproduction within the PCFG. It would also limit impacts on the recruitment of new PCFG members, because many PCFG whales are known to recruit to the group by accompanying their mothers to the area as calves (Subsection 3.4.3.4.1, PCFG Population Structure, PCFG Genetics and Recruitment).
2. An annual PCFG mortality limit would be set using the PBR formula in NMFS' most recent stock assessment report (currently Carretta et al. 2014), but using a recovery factor of 0.35, minus the estimated amount of mortality from other human causes, also as reported in NMFS' most recent stock assessment report.[4] Under present circumstances, this calculation would result in an annual mortality limit of approximately one PCFG whale (Subsection 4.1.4, Alternative 4, describes in more detail how the limit would be calculated). As described under Alternative 2, and in more detail in Subsection 3.4.2.1, Marine Mammal Protection Act Management, NMFS' stock assessment reports include an estimate of the level of human-caused mortality that will allow marine mammal stocks to achieve and remain above the lower level of their OSP. Other management goals are possible, however, such as achieving a population abundance that is closer to the stock's carrying capacity (Wade 1998). Applying the analysis in Wade (1998), a recovery factor of 0.35 would allow the PCFG to equilibrate at 80 percent of its carrying capacity over a 200-year period. By adopting this approach to setting a PCFG mortality limit, Alternative 4 responds to key concerns that we consider an alternative management goal other than the PBR goal, which would allow exploitation of a stock at a level that just maintains it at the lower end of its OSP range. This alternative also responds to key concerns raised by the Marine Mammal Commission that our NEPA analysis should consider accounting for other sources of human-caused mortality in setting a PCFG limit for a tribal hunt.
3. Unused portions of the PCFG mortality limit would not carry over to a subsequent year, except that when the allowable mortality level is less than 1 but greater than 0.5, it would be aggregated over 2 years, allowing for the mortality of one PCFG whale over 2 years. The purpose of not allowing mortality limits to carry over is to prevent mortality of multiple PCFG whales in a single year (unless the calculated mortality limit allowed for more than one whale to be killed) [5]. The purpose of allowing a carry-over when the mortality limit is greater than 0.5 but less than 1 is to afford

[4] It is possible that future stock assessment reports could discontinue reporting values for PCFG whales. In that case, NMFS would base these calculations on an alternative source(s) for the best available scientific information regarding PCFG whales.

[5] For example, the mortality limit could reach two whales in a single year if the PCFG minimum population estimate increased to 240 whales and all other variables remained constant (see Table 4-7).

the Tribe an opportunity to hunt at least every other year but with a harvest limit that is sensitive to declines in PCFG abundance or if PCFG whales are killed in unexpected numbers by other sources of human-caused mortality (the current level of human-caused mortality averages about 0.45 whales per year).

4. No hunting would be permitted when the PCFG mortality limit for a single year is less than 0.5. The purpose of this provision is to prohibit a hunt if the PCFG declines to half its current abundance or if PCFG whales are killed in unexpected numbers by other sources of human-caused mortality.
5. Any whale struck would be presumed to be a PCFG whale, even if it were landed and did not match a known PCFG whale. Although some portion of whales sighted in the west coast feeding areas during this period never return and are not considered PCFG whales, the majority of whales present during this period are PCFG whales. Also, it is likely that not all PCFG whales have been identified; thus, there may be unidentified PCFG whales present in the Makah U&A during this period.

2.3.5 Alternative 5 (Split-season Hunt)

Alternative 5 would have the same conditions as Alternative 2, except (1) there would be two hunting seasons of 3 weeks each: one from December 1 through December 21 and one from May 10 through May 31; and (2) an annual PCFG mortality limit would be set at 10 percent of PBR as calculated for the PCFG in NMFS' most recent stock assessment report (currently Carretta et al. 2014).[6] Under present circumstances, this calculation would result in a PCFG mortality limit of approximately 0.27 whales per year, or one whale every 4 years. (Subsection 4.1.5, Alternative 5, describes in more detail how the limit would be calculated.) Any whale struck but not landed would be counted as a PCFG whale in proportion to the observed presence of PCFG whales in the Makah U&A during that season.

The choice of seasons is intended to avoid killing a WNP whale and to minimize the chance of killing a PCFG whale. There are no observations of WNP gray whales in the Makah Tribe's U&A, but we can infer the timing of their likely presence there from observations in other areas (including photo identification and satellite tag transmissions) and their migration habits and patterns.

The selection of the seasons under this alternative would be based on dates WNP whales are observed in other locations and their theoretical travel routes and travel times to or from those locations

[6] It is possible that future stock assessment reports could discontinue reporting values for PCFG whales. In that case, NMFS would base these calculations on an alternative source(s) for the best available scientific information regarding PCFG whales.

(Subsection 3.4.3.2.1, WNP Seasonal Distribution, Migration and Movements). Unlike Alternative 4, Alternative 5 also avoids the season that defines the PCFG. This alternative responds to key concerns that a tribal hunt should be managed to avoid WNP whales while still minimizing the chance of taking a PCFG whale.

Setting a limit at 10 percent of PBR is consistent with NMFS' implementation of other sections of the MMPA governing marine mammal mortality. For example, Section 118 sets a goal for the incidental mortality of marine mammals in commercial fisheries at "insignificant levels approaching a zero mortality and serious injury rate." We have interpreted this goal as being met when commercial fisheries result in a mortality rate of marine mammals that is 10 percent or less of PBR (69 Fed. Reg. 43338, July 20, 2004). Subsection 101(a)(5)(A) of the MMPA allows us to authorize the lethal take of "small numbers" of marine mammals if the take is not intentional, is incidental to a specified activity, and will have a "negligible impact" on the marine mammal stock. The same requirements apply to incidental but not intentional lethal take in commercial fisheries of marine mammals listed as threatened or endangered under the ESA (subsection 101(a)(5)(E)). We interpret negligible impact to mean:

> An impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103).

In practice, we consider an incidental take that does not exceed 10 percent of PBR to have a negligible impact (64 Fed. Reg. 28800, May 27, 1999).

2.3.6 Alternative 6 (Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits)

Alternative 6 would have the same conditions as Alternative 2, except that strikes would be limited to seven over 2 years; an annual PCFG mortality limit would be set using the PBR formula as applied to the PCFG in NMFS' most recent stock assessment report (Carretta et al. 2014), minus other sources of human-caused mortality (similar to Alternative 4)[7]; and all whales struck but not landed would count against the PCFG limit based on their proportional presence during the season they were struck and lost (similar to Alternative 5). In addition, the waiver of the MMPA take moratorium would

[7] It is possible that future stock assessment reports could discontinue reporting values for PCFG whales. In that case, NMFS would base these calculations on an alternative source(s) for the best available scientific information regarding PCFG whales.

expire 10 years after adoption, and regulations governing the hunt would limit the term of any hunt permit to not more than 3 years.

By reducing the total number of strikes allowed compared to Alternative 2, Alternative 6 could reduce by as much as half the likelihood of a WNP whale being killed or harassed. Also, the limited duration of the MMPA waiver for take of ENP gray whales under Alternative 6 would serve two purposes. First, as described in Subsection 3.4.3.4.1, PCFG Population Structure, the status of the PCFG as a separate population stock under the MMPA remains unresolved. By adopting regulations with a set termination date, we would assure that the most up-to-date information regarding the status of the PCFG as a population stock would be considered after not more than 10 years. We selected 10 years because it allows a reasonable amount of time for NMFS to develop additional information about stock structure.

Finally, Alternative 6 would, by regulation, limit the term of any permit issued to the Makah Tribe to 3 years. The MMPA allows permits to be issued for up to 5 years and the Makah Tribe's request anticipates 5-year permits. Limiting the permit term to 3 years provides an opportunity for more frequent NMFS review than if permits were issued for 5 years. Some commenters on the 2008 DEIS recommended we include a permit period less than 5 years for this reason.

2.4 Alternatives Considered but Eliminated from Detailed Analysis

During the scoping process for this EIS, we reviewed several alternatives but eliminated them from further detailed analysis. These alternatives and the reasons for their elimination from detailed analysis are explained below.

2.4.1 Non-lethal Hunt

A non-lethal hunt alternative was requested by some members of the public. The commenters did not fully describe the details of this alternative, but it would likely include the Tribe engaging in some ceremonies and training preparatory to a hunt, a pursuit of whales on the water, and a mock attack on a whale, but would not culminate in a whale being killed or transported to shore.

Federal treaties and statutes are important in informing and identifying reasonable alternatives. Under the WCA and implementing regulations, whaling (which is synonymous with hunting in the aboriginal subsistence use context) clearly contemplates killing and attempts to kill whales (16 USC 916(j) and 50 CFR 230.2). Likewise, the definition of take under IWC and the MMPA contemplates lethal takes (16 U.S.C. 1362(13); 50 CFR 216.3). Furthermore, the right of fishing and of whaling or sealing was secured by the Makah through the 1855 Treaty of Neah Bay, which was written when fishing and whaling or sealing conveyed the opportunity to take animals lethally from each of these categories. The Tribe's waiver request seeks authorization to kill whales under those existing legal authorities and its interpretation of the scope of its treaty. A non-lethal hunt would therefore not meet the purpose and need for the Tribe's proposed action.

In addition, the non-lethal hunt alternative would have the same effect on the human environment as the No-action Alternative; therefore, its detailed analysis would not provide additional information to inform agency decision-making or the public's consideration. The conservation impacts on gray whales and the local ecosystem would be the same as the No-action Alternative because no gray whales would be removed by the Tribe from the population or from the ecosystem. The impact to the Makah Tribe would be the same as the No-action Alternative because the Tribe would not be allowed to hunt whales according to their historical and contemporary cultural understanding or within their understanding of the scope of their treaty right (in this respect, a non-lethal ceremonial hunt would also not meet the Makah Tribe's purpose and need). The other social and economic impacts would be the same as the No-action Alternative because a non-lethal hunt would not have significantly different public safety, aesthetic, sentimental, or economic impacts than if no hunting occurred. In addition, with a non-lethal hunt, gray whales would still be subjected to approaches and being struck with non-lethal weapons. To the extent such disturbance might cause whales to change their distribution, that effect is analyzed under the proposed action.

2.4.2 Subsistence Use of Drift Whales

Several commenters suggested that the Makah use drift whales (also known as stinker whales), rather than live whales, for subsistence purposes. Drift whales are whales that die naturally or as a result of some human activity other than a directed hunt (for example, entanglement in fishing gear). The large body size of the gray whale and its thick layer of blubber trap heat inside the whale after it dies, leading to rapid internal decomposition that makes most stranded whales unsuitable for human consumption.[8]

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[8] Since 1978, a total of 11 entangled gray whales have been reported within the Makah U&A (NMFS 1995; Scordino and Mate 2011; NMFS 2013a; Carretta et al. 2014). Of these, four or five animals are known to have died from entanglement and there is only record of the Makah Tribe making use of one such whale (in 1995). Effective with passage of the 1994 Amendments to the MMPA, members of the Northwest treaty Indian tribes advised NMFS of their intent to exercise their treaty rights to marine mammals (i.e., as was done with the 1995 whale carcass used by Makah tribal members) (NMFS 1995). However, the Tribe's usual response is to assist an entangled animal, and tribal biologists have participated in several recent disentanglement efforts, including help with two humpback whales in 2008 and 2010 (Cascadia Research Collective 2008, 2010a) and the successful disentanglement of gray whales in 2009 and 2013 (NMFS 2013a). Similarly, NMFS stranding records show that of the 10 animals that have stranded and died in the Makah U&A since 1994, only one had body parts (blubber and muscle, quantity unknown) that were used by the Tribe (Renker 2012), and all 10 whales were in a moderate to advanced state of decomposition at the time the carcass was examined (K. Wilkinson, NMFS, pers. comm., February 18, 2014).

This alternative would be essentially the same as the No-action Alternative. The conservation impacts on gray whales and the local ecosystem would be the same as those under the No-action Alternative because no gray whales would be removed from the population or from the ecosystem as a result of a hunt. The social and cultural impacts on the Makah would be the same as those under the No-action Alternative because they would not be allowed to hunt whales according to their historical and contemporary cultural understanding and within their concept of the scope of their treaty right. In this respect, a decision allowing only subsistence use of drift whales would not meet the Makah Tribe's purpose and need.

While this alternative would differ from the No-action Alternative because it would provide the Makah with an occasional and unpredictable supply of whale products, the agency could provide for the Tribe's use of drift whales without invoking the MMPA waiver provision (NOAA and Makah Indian Tribe 1989). The other social and economic impacts would be the same as those under the No-action Alternative, because the subsistence use of drift whales would not have significantly different public safety, sentimental, or economic impacts than a no-hunt alternative. The use of drift whales might have an impact on aesthetics, but some of that impact (the sight of a dead whale being butchered on the beach) would be the same as in any of the action alternatives. In addition, for the reasons described under the non-lethal hunt alternative (Subsection 2.4.1, Non-lethal Hunt), this alternative would not meet the purpose of and need for the Tribe's proposed action.

2.4.3 Set a Mortality Limit for PCFG Whales Relying on other MMPA Provisions or Management Goals

Several commenters on the 2008 DEIS stated that PBR was not appropriate for setting limits on harvest of PCFG whales, as proposed by the Tribe. We therefore considered other examples for setting mortality limits for marine mammals. One is incorporated into Alternative 4 (set a mortality level that would allow the PCFG to maintain 80 percent of carrying capacity) and another into Alternative 5 (set a mortality limit at 10 percent of PBR). We also examined other provisions of the MMPA that allow us to authorize killing marine mammals.

Waiver of the take moratorium under subsection 101(a)(3) of the MMPA is the only means of authorizing intentional killing of marine mammals except for subsection 109 (which allows us to return authority over marine mammals to the states, who may then authorize killing) and subsection 120 (which allows us to authorize states to kill seals and sea lions that are harming at-risk salmonid stocks). In addition, subsection 101(b) exempts Alaska Natives from the take moratorium but allows us to regulate such hunting for a depleted stock.[9] Other provisions of the MMPA allow us to authorize lethal and non-lethal take of marine mammals incidental to other activities. As described in Subsection 1.1.3, Summary of Gray Whale Status, we do not presently recognize the PCFG to be a separate marine mammal stock, but have found that it "may warrant consideration as a distinct stock in the future" and have established a PBR for it (Carretta et al. 2014). During internal scoping, we therefore considered whether any of these other provisions of the MMPA provide alternative methods of setting a mortality limit on PCFG whales that should be analyzed.

2.4.3.1 Subsection 109 Return of Authority to States

In adopting the MMPA, Congress expressly superseded state authority to manage marine mammals, but provided a mechanism in subsection 109(b) for returning that authority. Once a state has authority to manage marine mammals, it may authorize their killing if (1) the state has determined that the marine mammal stock is at OSP; (2) the state has determined the number of animals that may be taken without causing it to go below its OSP; and (3) the state does not permit the taking of a number greater than such number, including takes for subsistence purposes by Alaska residents (sections 109(b)(1)(C)(i)). We decided not to analyze in detail an alternative that would have a management scheme for PCFG whales similar to that of subsection 109(b) because Alternatives 3 through 6 already employ such a management scheme (that is, set a harvest level that will not cause the PCFG to fall below the lower bound of OSP). Including this alternative would therefore not provide additional information for the decision-maker.

2.4.3.2 Subsection 120 Authorization to Kill Seals and Sea Lions

In 2004, the states of Oregon, Washington, and Idaho requested authorization to kill California sea lions at Bonneville Dam on the Columbia River under subsection 120 of the MMPA. That provision allows us to authorize states to kill seals and sea lions that are having a significant negative impact on the decline or recovery of at-risk salmonids. The states proposed to limit the number of sea lions that could be removed each year to 1 percent of PBR and we adopted that limit in the authorization. In our environmental assessment, we concluded that killing a number of California sea lions up to 1 percent of PBR per year would not have a significant effect on the California sea lion population as a whole (NMFS 2008b).

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[9] Subsection 101(f) authorizes intentional killing in self-defense or defense of others and does not involve an authorization from NMFS.

We decided not to analyze in detail an alternative that would set a mortality limit for PCFG whales of 1 percent of PBR because such an alternative would not be substantially different from the No-action Alternative and so would provide no additional information for the decision-maker. Under current conditions, a mortality rate for PCFG whales of 1 percent of PBR would allow for the mortality of 0.027 PCFG whales per year or one whale every 37 years. In the event the Tribe killed a PCFG whale in a hunt, there would be no hunt for over 3 decades, which we considered equivalent to the No-action Alternative. In addition, a tribal hunt would be so infrequent under this alternative that it would not meet the purpose of and need for the Tribe's proposed action.

2.4.3.3 Regulation of Alaska Native Hunting of Depleted Beluga Whales

In 2008 we adopted regulations under MMPA subsection 101(b) governing Alaska Native hunting of Cook Inlet beluga whales after we had designated the stock as depleted (73 Fed. Reg. 60976, October 15, 2008). The regulations do not allow harvest when the 5-year average population abundance is less than 350 whales, and set a harvest limit at abundance levels above that based on the principle of a 95 percent certainty that the harvest would not delay the stock's time to recovery by more than 25 percent. We decided not to analyze in detail an alternative that would set a mortality rate limit for PCFG whales following the beluga whale model because there is no evidence that the PCFG is declining, as is the case for belugas. We therefore considered the model as not applicable. Subsection 3.4.3.4.3, PCFG Abundance and Trends, describes in detail the current status of the PCFG, which increased prior to 2002 and has since been relatively stable (Calambokidis et al. 2014). In addition, according to the analysis in Wade (1998), using a recovery factor of 0.35 in the PBR equation would not delay the time to recovery by more than 25 percent for a cetacean population with characteristics similar to the PCFG. Alternative 4 already incorporates a harvest limit based on a recovery factor of 0.35; therefore, including this alternative would not provide additional information to the decision-maker.

2.4.4 Hunt Other Marine Mammal Species Traditionally Hunted by the Tribe

This alternative, which was suggested by some members of the public, would substitute a gray whale hunt with a hunt for a different whale species or another marine mammal. Because the United States has not requested on behalf of the Makah that the IWC set aboriginal subsistence whaling catch limits for another large cetacean, and because the IWC has not considered such a request, the WCA precludes NMFS from publishing a quota for other whale species for the use of the Makah Tribe. In addition, some whales, such as the humpback whale and some marine mammal species (such as the western stock of Steller sea lions), are listed under the ESA.

Also, if non-ESA listed marine mammal species, such as pinnipeds or small cetaceans (e.g., dolphins and porpoises), were entirely or partially substituted for a gray whale, the total biomass harvested and the method used would likely differ (i.e., more individuals caught using different catch methods). As explained in Subsection 3.9, Cultural Resources, whaling and sealing do not hold equivalent historical or contemporary ceremonial and subsistence harvest values for the Makah Tribe. These differences would include the type of food obtained (blubber, meat, and whale bone), associated spiritual ceremonies, hunting activities (methods, timing, and area), and subsistence uses. In this respect, a decision requiring substitution of other marine mammal species in lieu of gray whales would not meet the Makah Tribe's purpose and need. The Makah's request is to exercise its treaty right to whale. A hunt focused on non-ESA listed pinnipeds and small cetaceans would be a different type of action, is too speculative to allow for an EIS analysis, and would not meet the purpose of and need for the Tribe's proposed action.

2.4.5 Change the Hunt Location

We considered other alternatives for either increasing or decreasing the Makah gray whale hunting area. Hunt location options that were considered but eliminated from further study are described in the following sections.

2.4.5.1 Hunt Outside the OCNMS but within the Offshore Migratory Path in the U&A

This option would allow the Makah to hunt whales in a small portion of the Tribe's U&A seaward of the outer Olympic Coast National Marine Sanctuary (OCNMS) boundary (Figure 1-1). The area off the coast of Washington that is outside the Strait of Juan de Fuca and the OCNMS but is within the Makah U&A is too small to provide for a successful hunt, is outside the Coast Guard RNA, and is beyond the 27-mile (43-km) offshore area where most whales have been sighted migrating past Washington (see Subsection 3.4.3.3.1, ENP Seasonal Distribution, Migration and Movements, for more information). For these reasons, this alternative would not meet the purpose of and need for the Tribe's proposed action.

Although the purpose of this alternative is to safeguard the natural resource values that led to designation of the OCNMS as a national marine sanctuary, OCNMS regulations allow for a Makah tribal hunt if otherwise legally permitted (15 CFR 922.152(a)(6)). OCNMS regulations allow for taking marine mammals pursuant to any treaty with an Indian tribe, as long as the taking is consistent with the MMPA, ESA, and Migratory Bird Treaty Act (16 USC 1431 *et seq*.). Alternative 3 (Offshore Hunt) is intended to allow consideration of Sanctuary resources in greater detail.

2.4.5.2 Hunt in Russia with Chukotka Natives

Members of the Makah Tribe currently have the option of hunting with the Chukotka Natives. Only those Makah Tribe members who participate in the hunt in Russia would have the opportunity to share in the ceremonial and subsistence value of the hunt because, by international law (Convention on the International Trade of Endangered Species), no whale products may be transferred out of the country of origin. Under the MMPA, in addition to international law, importing a marine mammal product without receiving authorization under the waiver process would be illegal.

This option would not allow the Makah Tribe to conduct a ceremonial hunt in its U&A using traditional Makah practices, nor would most of the tribal members be able to participate in celebrations that occurred when a whale was landed in Russia. Further, this option would not meet the Tribe's stated purpose and need to exercise its cultural values or treaty right. This option would require no action on the part of NMFS; therefore, it is similar to the No-action Alternative. Analysis of this alternative would not provide the agency or the public with information useful in informing our decision, because this alternative would require no decision on NMFS' part.

2.4.6 Employ Different Hunting Methods

During the scoping process, NMFS identified the following methods of striking and killing whales, based on the Tribe's request, internal NMFS scoping, public comments, and an examination of aboriginal subsistence hunting world-wide: (1) a toggle point harpoon to strike the whale and a .50 caliber rifle to kill the whale (as proposed by the Tribe); (2) a toggle point harpoon to strike the whale and a .577 caliber rifle to kill the whale; (3) a darting gun with explosive projectile as the striking and/or killing weapon; (4) a shoulder gun with explosive projectile as the killing weapon; (5) traditional methods only (harpoons to strike whales and lances to kill whales); and (6) a smaller caliber rifle as the killing weapon. The following subsections explain our rationale for not analyzing options 5 and 6 in detail. The other options are analyzed in detail as an element in common among all the action alternatives.

In reviewing public comment on the 2008 DEIS, we identified another alternative hunting method not considered in the scoping process or draft EIS. That alternative is the use of an all-motorized hunt. We included this element under Alternative 3 to allow consideration of whether use of an all-motorized hunt might expand hunting potential to other times of year and areas farther offshore, might improve the welfare of individual whales by decreasing time to death or the proportion of whales struck and lost, and/or might improve hunter or public safety.

2.4.6.1 Hunt Using Only Traditional Methods

This potential alternative, suggested in public comment, is best characterized as requiring the Makah to hunt using only pre-contact hunting methods. This would mean, for example, using mussel-tipped harpoons instead of toggle-point or steel-tipped harpoons, prohibiting the use of rifles to kill whales, and prohibiting the use of chase boats with outboard motors to follow the hunt and to tow whales. More information about pre-contact Makah hunting techniques can be found in Subsection 3.10.3.4, Makah Historic Whaling.

This alternative was eliminated from detailed consideration for a variety of reasons. The information presented in this EIS related to the method of the hunt must support and inform NMFS' future decisions about waiving the MMPA moratorium or issuing a permit. The agency may only issue a permit to take a marine mammal upon a determination that the manner of taking is humane (16 USC 1374(b)(2)(B)), which the MMPA defines as "the least possible degree of pain and suffering practicable" (16 USC 1362(4)). A whale may take several hours or days to die using only pre-contact methods. Modern technologies, such as those analyzed in detail in this EIS, result in quicker times to death than a hunt using only pre-contact methods.

WCA regulations also require that hunting not be conducted in a wasteful manner, which "means a method of whaling that is not likely to result in the landing of a struck whale or that does not include all reasonable efforts to retrieve the whale" (50 CFR 230.2). The use of powered vessels and backup hunters (e.g., harpooners and the rifleman) to chase and tow whales represents reasonable efforts to retrieve any struck whale and is more likely to meet WCA regulatory requirements than hunting using only traditional vessels.

Safety of hunters and the public must also be considered. A wounded whale experiencing a lengthy death could pose a greater risk to the whaling crew and public. This situation can be avoided by using some modern tools.

This alternative also does not meet the Makah Tribe's purpose and need. Requiring the Makah to hunt with pre-contact weapons, boats, and other tools is not justified because technologies, including using steel-tipped harpoons and accepting tows from steam-powered commercial tow boats, were used in traditional hunts as they became available.

2.4.6.2 Kill Whales with Smaller Caliber Rifles

Many of the aboriginal subsistence whale hunts conducted world-wide on large whales employ rifles to kill whales; some of these rifles are smaller than the .50 caliber rifle under the Proposed Action and the .577 caliber rifle used in the Makah's 1999 hunt. Three separate reports (Ingling 1999; Beattie

2001; Graves et al. 2004) have now examined humane killing and public safety aspects of the proposed Makah whale hunts, and all three authors concluded that a.50 caliber rifle (or greater) is the appropriate caliber of weapon to use.

Specifically, Ingling (1999) concluded that for large game, larger bullets are more effective in producing penetration deep enough to reach a vital organ or disabling site in the animal and thus require more power (i.e., heavier guns). In addition, rifles that are at least .50 caliber provide a better margin of error in targeting compared to smaller caliber rifles. Graves et al. (2004) added that "small caliber rifles simply will not do the job" of quickly killing large thick-boned whales; they concluded that the .50 caliber weapon was the best choice. Russian government reports on the number of small-caliber rifle rounds fired per whale in the Chukotka Native gray whale hunt support this conclusion (Subsection 3.4.3.5.4, Method of Killing and Time to Death). It is also supported by the recommendations from a recent IWC workshop report that identified several chemical and physical techniques for euthanasia of stranded whales, including high-caliber ballistics and explosives for baleen and sperm whales (IWC 2014b). The Ingling and Graves reports are discussed in further detail in later sections of this EIS (Subsection 3.15, Public Safety). As described in Subsection 2.4.6.1, Hunt Using Only Traditional Methods, the MMPA prescribes that taking a marine mammal must involve "the least possible degree of pain and suffering practicable" (16 USC 1362(4)). Smaller caliber rifles would not result in the least possible degree of pain and suffering practicable.

2.4.7 Alternative Compensation to the Makah Tribe

Compensation to the Makah Tribe for not whaling could be monetary, including financial support for a different venture (such as ecotourism associated with whale watching). Other types of compensation might be a loan for a casino resort, new facilities for health care improvements, other options for improving the quality of life on the reservation, or renegotiating the treaty and returning ceded lands. Any of these actions would, however, result in environmental conditions similar to those described under the No-action Alternative. No whale hunting would occur, and the other financial incentives (such as loans for casinos, resorts, improved health care, or ecotourism opportunities) would be provided to the Tribe with its agreement to forego future whaling. The No-action Alternative could occur at any time and would not be restricted to a specific future event. The Tribe was offered financial compensation by a private party in lieu of whaling during the fall of 1998. The Tribe, at that time, would not consider this offer (Anderson 2008a; Anderson 2008b; Tizon et al. 2008), and the tribe has maintained that position. This alternative was eliminated from further consideration because any of these activities would be speculative, with uncertain negotiations between the Tribe and other government and nongovernmental entities. In addition, this alternative would not meet the purpose of and need for the Tribe's proposed action (because there would be no whale hunt). Finally, impacts would be similar to the No-action Alternative; thus, a detailed examination of this alternative would not develop relevant information for the decision-maker.

2.4.8 **Alternatives Not Carried Forward from the 2008 DEIS**

The 2008 DEIS contained alternatives not carried forward here. One alternative would have required the Tribe to hunt outside 200 yards (183 meters) of any rocks or islands, to protect nesting seabirds and hauled-out marine mammals. We did not include that alternative here because Alternative 3, Offshore Hunt, would authorize hunting only outside 5 miles (8 km) from shore, which is beyond any rocks or islands.

The 2008 DEIS also contained alternatives that would have authorized the Tribe to hunt in the Strait of Juan de Fuca and to hunt year-round. We do not include those alternatives here. Alternative 4, Summer/Fall Hunt, analyzes the impacts of hunting during the summer season, rendering a year-round option unnecessary. The Tribe did not request and no commenters recommended a Makah gray whale hunt in the Strait of Juan de Fuca.

One alternative included in the 2008 DEIS would have set lower limits than those proposed by the Tribe on the total numbers of whales struck, struck and lost, and harvested. Analysis completed for the 2012 IWC Scientific Committee meeting shows that establishing a set annual limit of one or two PCFG whales did not meet the IWC's conservation objectives (IWC 2012d). For this reason, we have not included alternatives with a fixed limit on PCFG whales and instead rely on alternatives that set limits based on the fluctuating abundance of PCFG whales.

Section 3

Affected Environment

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3.0 AFFECTED ENVIRONMENT

This section describes the affected environment (environmental conditions in the project area) to provide background information for the assessment of the environmental effects of the alternatives in discussed in Section 4 (Environmental Consequences) and Section 5 (Cumulative Impacts). The affected environment subsections describe the pertinent aspects of resources and the current conditions within the project area that will be used to evaluate the anticipated environmental effects of the alternatives described in Section 2 (Alternatives). The first subsection describes geographically based management in the project area (including federally and internationally designated areas, and tribal management of reservations and usual and accustomed (U&A) fishing grounds) to provide context for the description of the other sections. The remaining subsections present the physical environment first, followed by the biological environment, then the social environment, of the project area. The order of the subsections is as follows:

- Geographically Based Management in the Project Area (Subsection 3.1)
- Water Quality (Subsection 3.2)
- Marine Habitat and Species (Subsection 3.3)
- Gray Whales (Subsection 3.4)
- Other Wildlife Species (Subsection 3.5)
- Economics (Subsection 3.6)
- Environmental Justice (Subsection 3.7)
- Social Environment (Subsection 3.8)
- Cultural Resources (Subsection 3.9)
- Ceremonial and Subsistence Resources (Subsection 3.10)
- Noise (Subsection 3.11)
- Aesthetics (Subsection 3.12)
- Transportation (Subsection 3.13)
- Public Services (Subsection 3.14)
- Public Safety (Subsection 3.15)
- Human Health (Subsection 3.16)
- National and International Regulatory Environment (Subsection 3.17)

The resources considered for environmental review in Sections 3 through 5 of this EIS are those that we have identified as having the potential to be affected by the project alternatives. To determine the correct resources to analyze, we first compiled a complete list of physical, biological, and social resources during internal agency project scoping. We then reduced the list to those that might have any potential to be affected by the project and published notices of intent in the Federal Register requesting public comments on various components of the EIS, including resources to be analyzed. After considering public comments, some resources were identified as not having the potential to be affected by the action alternatives, and are, therefore, not analyzed in this EIS. These resources include utilities, air quality, geology and soils, hazardous waste, energy, housing, light and glare, and National Historic Preservation Act cultural properties.

3.1 Geographically Based Management in the Project Area

The project area is confined primarily to the marine waters, islands, and land areas near the Makah Tribe's U&A in the Pacific Ocean and Strait of Juan de Fuca that may be directly or indirectly affected by the proposed whale hunt (Figure 1-1) (Subsection 1.1.2, Project Location). The project area encompasses several federally designated and managed areas, including the Olympic Coast National Marine Sanctuary (OCNMS or Sanctuary), the Washington Islands National Wildlife Refuges, the United States Coast Guard (Coast Guard) regulated navigation area (RNA), Olympic National Park, and internationally designated areas, including a United Nations World Heritage Site and the Olympic Biosphere Reserve. The project area also includes the Makah and Ozette Reservations. These designated and managed areas have objectives and policies that are directly or indirectly related to the proposed action as described below.

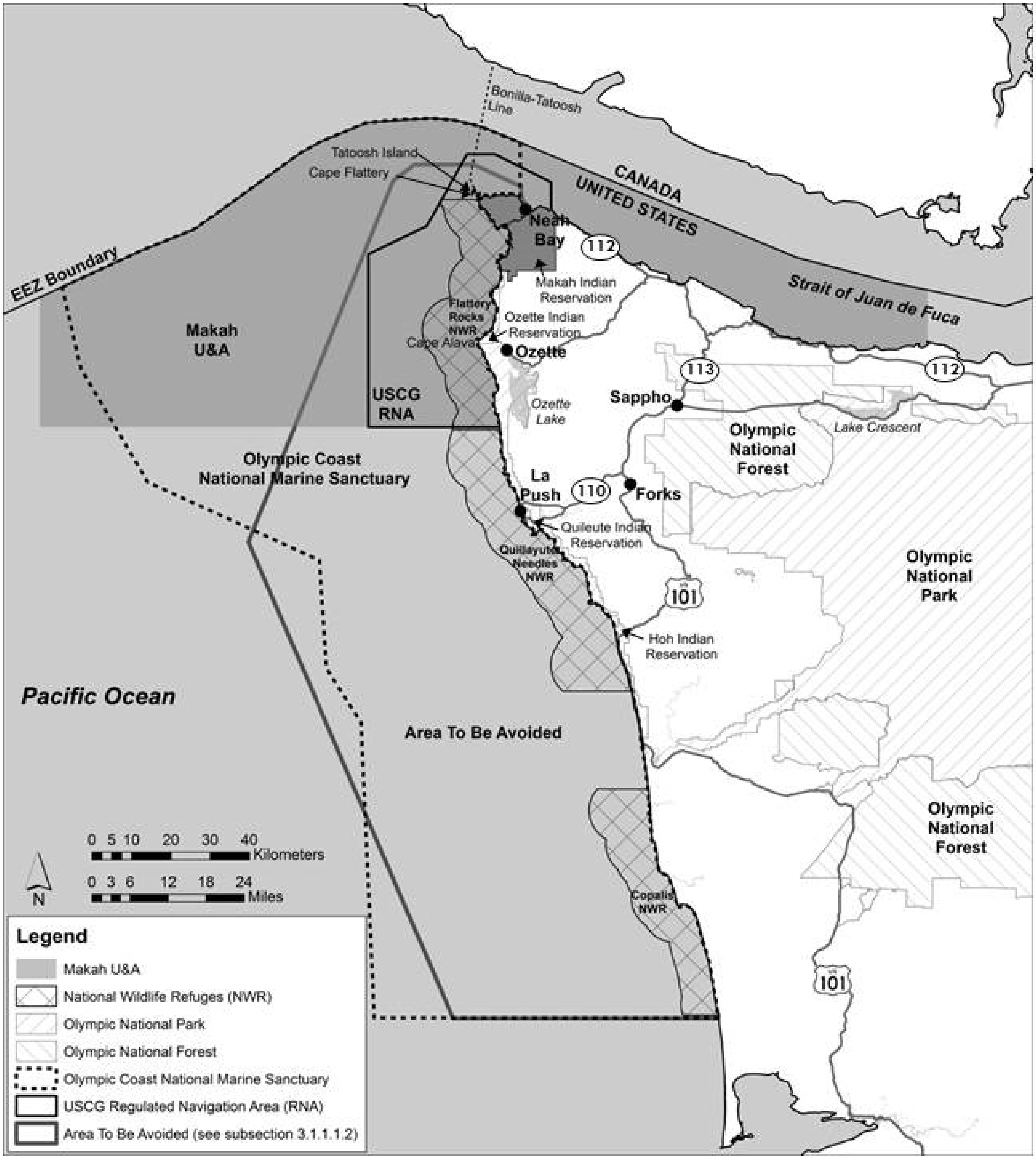

Figure 3-1. Designated and Managed Areas.

3.1.1 Designated Areas

3.1.1.1 Olympic Coast National Marine Sanctuary

3.1.1.1.1 Introduction

The Olympic Coast National Marine Sanctuary (OCNMS or sanctuary) is one of 13 national marine sanctuaries in United States waters, located off the northwest coast of Washington State and encompassing a 2,408-square-nautical-mile area of coastal and ocean waters and submerged lands along the Olympic Peninsula and the western portion of the Strait of Juan de Fuca. Figure 3-1. Designated and Managed Areas, identifies the portion of the OCNMS located in the project area.

3.1.1.1.2 Designation and Regulatory Overview

The Secretary of Commerce designated the OCNMS in 1994 as an area of special national significance under the authority of the National Marine Sanctuaries Act (16 United States Code [USC] 1431 *et seq.*) because of its unique and nationally significant collection of flora and fauna, and adjacency to the Olympic National Park. In the OCNMS Designation Document (published in 59 Fed. Reg. 24586, May 11, 1994) and 1993 Final EIS and Management Plan (National Oceanic and Atmospheric Administration [NOAA] 1993), NOAA noted that the Sanctuary is a highly productive, nearly pristine ocean and coastal environment that is important to the continued survival of several ecologically and commercially important species of fish, seabirds, and marine mammals. In the Designation Document and the Final EIS and Management Plan, NOAA enumerated biological and historical resources that give the Sanctuary particular value (NOAA 1993). Some of the biological resources NOAA identified that give the Sanctuary particular value include high biological productivity, diversity of habitats, a wide variety of marine mammals and birds living in or migrating through the area, and the presence of endangered and threatened species and essential habitats.

In particular, NOAA noted that the unusually large and diverse range of habitats present in the Sanctuary includes the following:

- Offshore islands and rocks (most are within the Flattery Rocks, Quillayute Needles, and Copalis National Wildlife Refuges)
- Large and diverse kelp beds
- Intertidal pools
- Erosional features (such as rocky headlands, seastacks, and arches)
- Interspersed exposed beaches and protected bays
- Submarine canyons and ridges

- The continental shelf (including a broad shallow plateau extending from the mouth of the Juan de Fuca canyon)
- Continental slope environments

The numerous sea stacks and rocky outcrops along the Sanctuary shoreline, coupled with a large tidal range and wave splash zone, support some of the most diverse and complex intertidal zones in the United States (59 Fed. Reg. 24586, May 11, 1994). NOAA also identified several historical resources that give the Sanctuary particular value, including Indian village sites, ancient canoe runs (intertidal pathways cleared of boulders and cobble), petroglyphs, Indian artifacts, and numerous shipwrecks (NOAA 1993; 59 Fed. Reg. 24586, 24604, May 11, 1994). Extensive archeological work oriented toward late prehistoric culture had been completed along the Washington coastline at the time of designation, including a major archeological dig conducted at Ozette, near Cape Alava that uncovered an ancient village thought to be 2,000 years old and considered to be one of the most significant excavations in North America (NOAA 1993). NOAA also found that an important feature of the Sanctuary is its proximity to four Native American reservations and the U&As of the Makah, Quileute, Hoh, and Quinault Indian Tribes. Tribal members use the Sanctuary area for subsistence and commercial harvesting and for religious ceremonies; the presence of Indian tribes along the coast adds special cultural character and historical significance to the Sanctuary (NOAA 1993).

NOAA's National Ocean Service, Office of National Marine Sanctuaries, administers the OCNMS, and is managed by Sanctuary staff in Port Angeles, Washington. The mission statement of the OCNMS program is to protect the Olympic Coast's natural and cultural resources through responsible stewardship, to conduct and apply research to preserve the area's ecological integrity and maritime heritage, and to promote understanding through public outreach and education. These multiple-use management objectives are achieved through both cooperative management and regulation. NOAA finds that one of the major benefits of establishing the OCNMS is the integration of important nearshore and oceanic marine resource zones and corresponding human activities, including federal, state, and tribal management of those activities, under one coordinated management regime (NOAA 1993). To this end, Sanctuary staff coordinates management with the Washington State Departments of Ecology (Ecology), Natural Resources, Fish and Wildlife, and Agriculture; the United States and Canadian Coast Guards; the United States Fish and Wildlife Service (USFWS); the National Park Service; the four coastal tribes (Makah, Quileute, Hoh, and Quinault Indian Tribes); local businesses, towns, counties, and timber and fishing representatives; and research and education institutions. The Olympic Coast

National Marine Sanctuary Advisory Council was established in 1999 to provide advice on the management and protection of the Sanctuary. A community-based body, the Advisory Council, through its members, serves as a liaison to the community regarding Sanctuary issues and represents community interests, concerns, and management needs to the Sanctuary. The council comprises representatives of Indian tribes, state and local governments, other federal agencies, maritime industry, fishing, education, tourism, conservation organizations, and the community at large. The Sanctuary Advisory Council operates under a charter and serves strictly in a voluntary, advice-giving role. The Sanctuary program staff also reviews ocean management in the OCNMS with the four coastal tribes, including the Hoh Tribe, Makah Tribe, Quileute Tribe, and Quinault Indian Nation, and the State of Washington, through the Intergovernmental Policy Council (NOAA 2007). The Intergovernmental Policy Council was created by a memorandum of agreement signed in 2006 and updated in 2012 (NOAA 2007; NOAA 2012).

Regulations governing the OCNMS are located at 15 Code of Federal Regulations (CFR) Part 922, Subpart O. The regulations describe Sanctuary boundaries, prohibit certain kinds of activities, and set up a permitting system to allow some activities that are otherwise prohibited. Activities generally prohibited in the OCNMS include offshore oil, gas, and mineral exploration, development, or production; pollution discharge; seabed disturbance; and possessing, moving, removing, or injuring any historical resource. Prohibited activities that are particularly relevant to the proposed action include flight level restrictions and marine mammal take restrictions. Flying motorized aircraft at less than 2,000 feet both above the Sanctuary and within 1 nautical mile of the shoreline or National Wildlife Refuge islands is prohibited under 15 CFR 922.152(7), unless the Sanctuary staff issues a permit (with certain exceptions such as valid law enforcement and specified tribal activities). This prohibition is consistent with the 2,000-foot flight advisory over the adjacent Olympic National Park and National Wildlife Refuges and is designed to limit the potential effects of noise, particularly as it might affect hauled-out seals and sea lions, sea otters, and nesting birds along the shoreline and offshore rocks and islands of the Sanctuary (NOAA 1993; 77 Fed. Reg. 3919, January 26, 2012).

Regulations also prohibit taking any marine mammal, sea turtle, or seabird in or above the Sanctuary, except as authorized by the Marine Mammal Protection Act (MMPA), the Endangered Species Act (ESA), and the Migratory Bird Treaty Act, or pursuant to any treaty with an Indian tribe to which the United States is a party (15 CFR 922.152(6)). If the taking is conducted pursuant to an Indian treaty, the taking is to be exercised in accordance with the MMPA, ESA, and the Migratory Bird Treaty Act, to the extent that they apply (15 CFR 922.152(6)). For applicability of these federal laws to the Makah Tribe's treaty right of taking fish and of whaling or sealing at usual and accustomed grounds and stations, refer to Section 1, Purpose and Need, and Section 2, Alternatives, of this EIS.

3.1.1.1.3 Current Issues

Management Plan. The 2011 OCNMS Management Plan contains goals and objectives for collaborative partnerships, resource management, research, and education programs (NOAA 2011a). The management plan contains 20 action plans, organized under five goals: (1) achieve effective collaborative and coordinated management; (2) conduct collaborative research, assessments, and monitoring to inform ecosystem-based management; (3) improve ocean literacy; (4) conserve natural resources in the sanctuary; and (5) understand the Sanctuary's cultural, historical, and socioeconomic significance. The Makah Tribe is a key partner in many of the activities within the 20 action plans.

Area to be Avoided (ATBA). In 1995, Sanctuary staff worked with the Coast Guard and the International Maritime Organization to establish an area to be avoided for the primary purpose of preventing a catastrophic oil spill. The area to be avoided is a voluntary ship traffic management program that applies to all ships and barges carrying cargoes of oil or hazardous materials, as well as all ships of a certain size that are solely in transit. Effective December 1, 2012, the applicable size for ATBA compliance was lowered from 1,600 to 400 gross tons. Operators of such vessels are advised to maintain a 25-mile buffer from the coastline in the southern portion of the area to be avoided, narrowing to approximately 8 nautical miles west of Cape Flattery and 1 nautical mile (1.2 miles) north of Neah Bay. This area to be avoided corresponds largely with the nearshore portion of the Makah Tribe's U&A (Figure 3-1). The restrictions do not apply to vessels that are engaged in an otherwise permitted activity that occurs predominantly within the Sanctuary, such as fishing or research. Of 4,193 vessel transits through the Sanctuary in 2013, all but 127 remained outside of the area to be avoided, equating to an estimated compliance rate of 97 percent (OCNMS 2013). More information on vessel traffic can be found in Subsection 3.13.3.2, Marine Vessel Traffic. See also Subsection 3.2.3.3, Spill Prevention.

Sanctuary Cooperation with the Makah Tribe. The Makah Tribe is a key partner in Sanctuary public relations, education, and outreach. The Makah Cultural and Research Center has fostered a strong relationship with the Sanctuary through development and implementation of a cooperative interpretive program centered on the Makah Reservation. Since 2000, the Sanctuary has provided annual funding to the Makah Cultural and Research Center to hire Makah interpreters and guides for a 17-week summer program. Makah interpreters hosted more than 15,000 visitors to the

Reservation, who learned about coastal issues, the Sanctuary, Makah culture, and natural history within the area. Sanctuary staff also supported the creation of the Makah Office of Marine Safety to provide technical assistance in developing and planning pollution prevention strategies and to represent the Tribe's interest in guarding treaty-protected resources from oil spills (NOAA 2006). For more information on spill prevention, see Subsection 3.2.3.3, Spill Prevention. Since 2006, the Makah Tribe has also been a member of the Sanctuary's Intergovernmental Policy Council.

3.1.1.2 Washington Islands National Wildlife Refuges

More than 870 islands, rocks, and reefs above the mean high water line and extending for more than 100 miles (161 km) along the coast of Washington State are included in three national wildlife refuges: Quillayute Needles, Flattery Rocks, and Copalis (collectively called the Washington Islands National Wildlife Refuges). The islands range from less than 1 acre (0.4 ha) to about 36 acres (15 ha), and most drop abruptly into the sea. The islands' offshore location provides protection from human disturbance and land predators while providing close proximity to abundant ocean food sources. The islands provide refuge for more than 20 species of birds as they nest and raise their young; the total population of seabirds, waterfowl, and shorebirds may exceed 1 million birds (Subsection 3.5.3.2, Existing Conditions, Other Marine Wildlife). In addition, sea lions, seals, sea otters, porpoises, and whales are commonly found on and/or around the islands (Subsection 3.5.3.1, Existing Conditions, Marine Mammals). All three refuges were originally established as migratory bird sanctuaries through Executive Orders 703, 704, and 705 issued by President Theodore Roosevelt in 1907, and later redesignated as refuges in 1940 (Presidential Proclamation, July 30, 1940) and wilderness areas in 1970 (under the Wilderness Act of 1964, 16 USC 1131 *et seq.*), except for Destruction Island, which was excluded because of the presence of an operational Coast Guard lighthouse on the island. Only the Flattery Rocks National Wildlife Refuge is within the Makah Tribe's U&A and the OCNMS; it extends along the Pacific Coast from the western edge of Cape Flattery south to near the southern boundary of the Makah U&A.

The refuges are maintained as a sanctuary for nesting seabirds and marine mammals and are managed by the USFWS. The USFWS coordinates with NOAA's Olympic Coast National Marine Sanctuary staff to prohibit motorized aircraft flying less than 2,000 feet above certain portions of the refuges. The USFWS also manages the refuges cooperatively with the National Park Service through a memorandum of understanding because the refuges are within the exterior boundaries of Olympic National Park (National Park Service and USFWS 1993). The objective of the Washington Islands National Wildlife Refuges is to enhance protection and interpretation of the wildlife, and natural and scenic resources of the refuges by taking the following measures:

- Minimizing human impacts
- Maintaining the wilderness character of the area
- Helping the public understand and appreciate the value of the refuges
- Conducting research to understand the refuge resources

The USFWS has also issued advisories and permits regulating public access to the islands and recommends a voluntary 200-yard (183-m) exclusion area around each island to avoid the flushing of nesting seabirds by boat and other vessel traffic (USFWS 2007). All of the islands in the project area are less than 3 miles from shore.

The USFWS prepared a Washington Islands National Wildlife Refuges Comprehensive Conservation Plan/Environmental Assessment (EA) (USFWS 2007) to guide its management of the Flattery Rocks National Wildlife Refuges, as well as the Quillayute Needles and Copalis National Wildlife Refuges. Management activities include monitoring the refuge wildlife and protecting and maintaining the natural functioning ecosystem. The plan directs the USFWS to coordinate with other agencies and tribes to ensure continuation of the long-term health and viability of native seabird and marine wildlife populations, with a focus on pinnipeds. The Washington Islands National Wildlife Refuges Comprehensive Conservation Plan/EA includes the Treaty of Neah Bay as a law or executive order potentially applicable to its Comprehensive Conservation Plan/EA (USFWS 2007) (specifically, the Tribe's fishing, whaling, and sealing rights within its U&A, as well as hunting and gathering rights on open and unclaimed lands). The Washington Islands National Wildlife Refuge System adheres to laws, regulations, and policies applicable to all National Refuge Systems (50 CFR Subchapter C, Parts 25 to 32). Goals, objectives, and strategies applicable to the Washington Islands National Wildlife Refuge Comprehensive Conservation Plan/EA are listed below:

- Protect migratory birds and other native wildlife and their associated habitats, with special emphasis on seabirds.
- Protect and support the recovery of federally threatened and endangered species and Washington State special status species and their associated habitats.
- Promote and manage the Washington Islands Wilderness Area to maintain its wilderness character and values.

- Promote effective coordination and cooperation with others for conservation of refuge resources, with special emphasis on government agencies and tribes with adjoining ownership and/or jurisdiction.
- Continue to enhance long-term monitoring and sustained applied research.
- Increase public interpretation and awareness programs to enhance appreciation, understanding, and enjoyment of refuge resources.

3.1.1.3 Coast Guard Regulated Navigation Area

The United States Coast Guard has established a RNA (Figure 3-1) in the Strait of Juan de Fuca and adjacent coastal waters of northwest Washington (33 CFR 165.1310) under its Ports and Waterways Safety Act authority (33 USC 1221 *et seq.*), allowing the Coast Guard to enforce vessel activities near any Makah whale hunt and reduce the danger of loss of life and property from any hunt. When finalizing the RNA after the 1999 hunt, the Coast Guard specifically found that “the uncertain reactions of a pursued or wounded whale and the inherent dangers in firing a hunting rifle from a pitching and rolling small boat are likely to be present in all future hunts, and present a significant danger to life and property if persons or vessels are not excluded from the immediate vicinity of a hunt” (64 Fed. Reg. 61212, November 10, 1999).

The RNA rests entirely within the Makah U&A (Figure 3-1). The RNA boundaries enclose waters off Neah Bay and the Strait of Juan de Fuca in the north, wrap around Cape Flattery and Tatoosh Island, and then parallel the shore at a 10-nautical-mile (11.5-mile/18.5-km) distance until the southern boundary is formed by connecting to the shore at the southern extent of the U&A. The Coast Guard extended the southern boundary of the RNA to match the southern boundary of the U&A when the final rule was promulgated in 1999 (64 Fed. Reg. 61212, November 10, 1999). When the interim rule (63 Fed. Reg. 52609, October. 1, 1998) was in force during the 1999 Makah whale hunt, most of the Makah whale hunting and associated protesting activities occurred farther south than the borders of the RNA (though the whale hunting activities and the protesting incidents still occurred within the Makah U&A) (Subsection 1.4.2, Summary of Recent Makah Whaling – 1998 through 2013).

Within the RNA during any Makah whale hunt, a Moving Exclusionary Zone (MEZ) for “the column of water from the surface to the seabed within a radius of 500 yards (457 m) centered on the Makah whale hunt vessel” is activated when one Makah whale hunt vessel displays an international numeral pennant five (5) between sunrise and sunset when surface visibility exceeds 1 nautical mile (33 CFR 165.1310(b)). No person or vessel may enter the MEZ when it is activated, except for the authorized Makah whale hunt vessel and an authorized media pool vessel preauthorized by the Coast Guard. An additional vessel(s) or person(s) can be authorized by the Coast Guard (33 CFR 165.1310(c)), such as the observer vessel. The authorized media pool vessel must maneuver to avoid positioning itself between whales and hunt vessels, out of the line of fire, at a prudent distance and location relative to the whale hunt operations, and in a manner that avoids hindering the hunt or path of the whale in any way (33 CFR 165.1310(f)(3)). The media pool vessel operates at its own risk, but must adhere to safety and law enforcement instructions from Coast Guard personnel (33 CFR 1310(f)). The regulation does not affect normal transit or navigation in the RNA. For more information about the operation of the RNA and the MEZ during Makah whale hunting from 1998 to 2000, refer to Subsection 1.4.2, Summary of Recent Makah Whaling – 1998 through 2007; Subsection 3.15.2.1, Vessel Safety Regulations and Authorities; and Subsection 3.15.3.4, Behavior of People Associated with the Hunt.

3.1.1.4 Olympic National Park

The Olympic National Park comprises 922,651 acres located primarily in the center of the Olympic Peninsula and includes lands along the upper northern coast of Washington State (Figure 3-1). President Theodore Roosevelt originally created the Olympic National Monument in 1909; Congress later redesignated and authorized the monument as a National Park in 1938 (Chapter 812, 52 Stat. 1241). In 1988, Congress designated about 95 percent of the park (876,669 acres) as wilderness through the Washington Park Wilderness Act (16 USC 90 note, Public Law 100-668). It is now one of the largest wilderness areas in the contiguous United States. Combined with the OCNMS, the two designations protect almost 5,000 square miles (12,950 sq. km) of intertidal, island, and ocean habitats. The National Park Service is the federal agency that manages the park to preserve and protect, unimpaired, the park's diverse natural and cultural resources and provide for the enjoyment, education, and inspiration of present and future generations. More than 650 archeological sites documenting 10,000 years of human occupation are protected within the Olympic National Park lands (National Park Service 2008). Ten Olympic Peninsula tribes retain their ongoing connection to traditional lands within the park, including the Makah Tribe, Hoh Tribe, Jamestown S'Klallam Tribe, Quileute Tribe, Quinault Nation, Skokomish Tribe, Squaxin Tribe, Suquamish Tribe, Elwha Klallam Tribe, and Port Gamble S'Klallam Tribe. The park also protects cultural resources that reveal and document the 200-year history of discovery, exploration, homesteading, and community development in the region (National Park Service 2008).

The National Park Service prepared a general management plan/EIS for the park that describes a vision for its future (National Park Service 2008). The plan is intended to guide park decision-making for the next 15 to 20 years. Management emphasis for the National Park Service's preferred alternative is protecting resources and improving visitor experiences. This goal would be accomplished by accommodating diverse visitor use, providing sustainable access on existing roads, improving mass transit opportunities, and concentrating improved educational and recreational opportunities on the developed park edges.

3.1.1.5 World Heritage Site

The Olympic National Park was designated as a United Nations Educational, Scientific, and Cultural Organization World Heritage Site in 1981, and it is one of 20 World Heritage Sites in the United States (UNESCO 1981). The World Heritage Site list was established under the terms of the Convention Concerning the Protection of World Culture and Natural Heritage that was adopted in 1972 at the 17th General Conference of the United Nations Educational, Scientific, and Cultural Organization. World Heritage Site objectives are to encourage the identification, protection, and preservation of cultural and natural heritage sites that are considered to be of outstanding value to humanity. These sites are listed in order to protect them for future generations to appreciate and enjoy.

3.1.1.6 Olympic Biosphere Reserve

The Olympic Peninsula, including the Olympic National Park, was designated as a biosphere reserve in 1976 (UNESCO 1976). Biosphere reserves are areas of terrestrial and coastal ecosystems promoting solutions to reconcile the conservation of biodiversity with sustainable use. The reserves are internationally recognized, nominated by national governments, and remain under sovereign jurisdiction of the states where they are located. Each biosphere reserve is intended to fulfill three basic functions:

- Conservation function that contributes to the conservation of landscapes, ecosystems, species, and genetic variation
- Development function that fosters economical and human development that is socio-culturally and ecologically sustainable
- Logistic function that provides support for research, monitoring, education, and information exchange related to local, national, and global issues of conservation and environment

The objective of this designation is to set aside areas with representative ecosystems to achieve the fullest possible biogeographical cover over the world and ensure systematic conservation of biodiversity.

The Olympic Biosphere Reserve is one of 51 designated biosphere reserves in the United States. This reserve is considered one of the best examples of intact and protected temperate rainforests in the Pacific Northwest. Other outstanding characteristics include rivers supporting some of the best habitat for anadromous fish species, the longest undeveloped wilderness coast in the United States, and rich native and endemic animal and plant species (UNESCO 1981).

3.1.1.7 Other Designated Areas

NMFS and the PFMC have identified essential fish habitat within the project area under Magnuson-Stevens Act authority. More information about the establishment and identification of essential fish habitat and habitat areas of particular concern is presented in Section 3.3, Marine Habitat and Species. We have also identified ESA critical habitat for certain threatened and endangered species occurring within the project area. More information on critical habitat of fish species occurring within the project area is in Section 3.3, Marine Habitat and Species. More information on critical habitat for other marine wildlife, including for Southern Resident killer whales (71 Fed. Reg. 69057, Nov. 29, 2006), is in Subsection 3.5.3.1.1, ESA-Listed Marine Mammal Species, and Subsection 3.5.3.2.1, ESA-Listed Species (Other Marine Wildlife).

3.1.2 Makah Management of Reservation and U&A Areas

The Makah Reservation is located on the northwestern-most tip of the Olympic Peninsula (Figure 3-1) and encompasses 44 square miles (114 sq. km) of land (30,142 acres) bounded by the Pacific Ocean to the west and the Strait of Juan de Fuca to the north. The approximately 1-square-mile (2.6 sq. km) Ozette Reservation, 10 miles (16 km) south of Neah Bay, is also part of the Makah Reservation, with the Olympic National Park managing the contiguous shoreline between the two areas of the reservation.

The relationship between the United States and the Makah Tribe was formalized upon ratification of the Treaty of Neah Bay in 1855. Following the 1975 Indian Self-Determination and Education Assistance Act (Public Law [PL] 93-638), the Tribe entered into self-determination contracts with the Bureau of Indian Affairs (BIA). Later, the Tribe entered into tribal self-governance compacts in accordance with the Tribal Self-Governance Act of 1994 (PL 103-413). The tribal self-governance compact incorporates virtually all BIA programs on the reservation. The Tribe has also entered into a self-governance compact with the Department of Health and Human Services (under the Tribal Self-Governance Amendments of 2000, PL 106-260), addressing the delivery of health services to tribal members. In addition, following a series of court decisions establishing the right of the Makah and other Washington state treaty tribes to half the harvestable surplus of salmon (*United States v. Washington* 1974 [Boldt decision]) and shellfish (*United States v.*

Washington 1994 [Rafeedie decision]), the federal government formally recognized that the four Washington coastal tribes (Makah, Quileute, Quinault, and Hoh) have treaty rights to groundfish in their respective U&As (Pacific Fishery Management Council and NMFS 2006). In accord with these decisions and recognition, the Makah Tribe participates in a variety of fisheries management forums such as the North of Falcon process, the Pacific Fisheries Management Council, the Pacific Salmon Treaty, the International Pacific Halibut Commission, and Pacific Whiting Treaty Joint Management Committee.

The Makah Tribe is governed by an elected tribal council. The Constitution and Bylaws of the Makah Indian Tribe, adopted in 1936, describe the organization and authority of the Makah Tribal Council. The council consists of five members elected for staggered 3-year terms. The Makah Tribal Council selects officers from its membership, including, but not limited to chairman, vice-chairman, and treasurer. Currently, the secretary is appointed from outside the Makah Tribal Council. The secretary is a tribal employee fulfilling the requirements of the office on behalf of the Makah Tribal Council. Any enrolled tribal member who is 21 years of age or older and has lived on the reservation for 1 year immediately preceding an election is eligible to vote, and any legal voter is eligible to be elected to serve on the Council.

As stated in the Constitution and Bylaws of the Makah Indian Tribe, the powers of the Tribal Council include the power to perform the following actions:

> To promulgate and enforce ordinances, which shall be subject to review by the Secretary of the Interior, governing the conduct of members of the Makah Indian Tribe, and providing for the maintenance of law and order, and the administration of justice by establishing a reservation Indian court and defining its duties, powers, and limitations . . . . To safeguard and promote the peace, safety, morals and general welfare of the Makah Indian Tribe by regulating the conduct of trade and the use and disposition of property upon the reservation . . . . To adopt resolutions regulating the procedure of the council itself and other tribal agencies and tribal officials of the reservation (Article IV, Sections 1(i), (j), and (n)).

The constitution and bylaws may be amended by a majority vote of the qualified tribal voters. A referendum on any proposed or enacted ordinance or resolution of the Tribal Council may be called if at least one-third of the qualified tribal voters petition for one. The majority vote of such a referendum is conclusive and binding on the Makah Tribal Council.

Laws and regulations are enforced under the provisions of the Makah Law and Order Code. The Makah Law and Order Code establishes a tribal court, defines its jurisdiction, provides for tribal police, details the selection and procedures for judges and juries, and includes a criminal code and procedures for criminal and civil actions. If NMFS authorizes a gray whale hunt, the Tribe proposes to adopt laws and regulations to enforce NMFS' regulations governing the hunt.

3.1.2.1 Makah Tribal Departments, Agencies, and Commissions

The Makah Tribal Council oversees the operations and management of approximately 15 governmental departments, 6 tribally chartered organizations, and the Makah Whaling Commission. The Council identifies priorities and aids Departments in planning through a strategic planning process. A 5-year strategic plan was developed in 2005 and updated in 2006 (Makah Tribe 2006b). The Makah Tribe is currently developing a new 5-year strategic plan (M. Parker, Makah Tribe General Manager via J. Scordino, Makah Tribe Marine Mammal Biologist, pers. comm., November 4, 2014). The new draft 5-year plan describes the Makah Departments:

Makah Social Services comprises six programs: Domestic Violence Program, Low Income Home Energy Assistance Program, General and Employment Assistance Program, Family Services Program, Senior Citizens Program, and United States Department of Agriculture Food Distribution Program.

Makah Employment and Training provides services to tribal/community members for higher education and the Workforce Investment Act program, i.e., funding, work placements, employment and training, and clothing vouchers.

Makah Realty protects and promotes the trust assets (realty and physical property) of the Makah Tribe and the tribal membership.

Makah Operations addresses essential and basic health, legal, transportation, and community beautification.

Makah Judicial Services provides a forum for resolving disputes that is consistent with applicable governing laws and in keeping with the traditional and cultural values of the Makah Tribe. This includes the tribal court system.

Makah Housing Authority builds, rehabilitates, and weatherizes homes; acquires land for neighborhood revitalization development; and develops local capacity to provide these services.

Makah Human Resources promotes an effective and efficient work environment for the employees of the Makah Tribe.

Makah Community Gym promotes wellness in the community through planned events, youth programs, and making exercise facilities available to all.

Makah Early Childhood Education runs the Head Start/ Early Head Start program to prepare preschool-aged kids and younger for school, and runs childcare services that are used by many members of the Neah Bay community.

Makah Health Services (Sophie Trettevick Indian Health Center) provides primary medical care and dental services. The clinic is open Monday through Friday, from 8:00 a.m. to 5:00 p.m., with emergency service available via 911, 24 hours a day, 7 days a week. Emergency medical situations are addressed by providing stabilization and transport to the nearest appropriate facility. Airlift Northwest (Seattle) can be called in, based on emergency medical technician and/or provider determination. If Airlift Northwest is not available, the Coast Guard may provide transport. The Coast Guard responds to open-water-related emergencies. Although the health clinic provides day-to-day care service to tribal members, it will treat anyone with life- or limb-threatening injuries. Such injured non-Indians are treated to stabilize their injuries and then transported to an appropriate facility. The facility has a memorandum of agreement with Clallam Bay Fire District 5 to provide mutual assistance in emergency situations.

Makah Forestry establishes and develops policies to guide management of the forested lands of the Makah Indian Reservation and serves as a basis for decision-making by Makah Natural Resources Departments and the Makah Tribal Council.

Makah Public Safety departments include the Police Department, Corrections, Communications, Adult Probation, Natural Resources Enforcement, Emergency Medical Services, Fire Department, Animal Control, and Emergency Management. Police officers are responsible for tribal law and ordinance enforcement and public safety. Natural resources enforcement officers are responsible for enforcing hunting, fishing, and forest products permits/regulations. They are trained law enforcement officers who can supplement the Police Department officers, as needed. The Fire Department consists of full-time employees and trained volunteers to run engines and aid cars to respond to fires and other emergencies. Emergency Medical Services provide emergency medical care 24 hours per day to residents and visitors to the Reservation. Emergency Management provides infrastructure and plans for response to catastrophic events (e.g., tsunamis).

Makah Planning (Community Planning and Economic Development) provides integrated, comprehensive, and traditional planning support to the Makah Tribal Council in decision-making concerning economic and community development.

Makah Fisheries Management is responsible for protecting, sustaining, and enhancing the relationship between the Makah Tribe and the many aquatic species that play a vital part in the Tribe's cultural and economic well-being. Makah Fisheries Management manages more than 20 different fisheries within the Tribe's U&A. The fisheries target a wide variety of fish species, use diverse gear types, and span seasonal time periods throughout the entire year. Makah Environmental Division, which is located within Makah Fisheries Management, includes Treaty Reserved Rights Protection, Environmental Planning, Environmental Health, Air Quality, Water Quality/Resources, and Environmental Education.

Makah Whaling Commission. The Makah Tribal Council first adopted the Charter of the Makah Whaling Commission in 1996 with Resolution 10-97, and amended it in 2001 with Resolution 100-01. The Commission is organized around the traditional heads of Makah families for the purpose of advising and making recommendations to the Makah Tribal Council regarding "rules and regulations to govern the conduct of treaty ceremonial and subsistence whaling," and "the administration and enforcement of such regulations, and [the] conduct[ing of] educational programs and research relating to ceremonial and subsistence whaling" (Makah Whaling Commission Charter 2001). The Makah Tribal Council considers the Whaling Commission's recommendations regarding tribal regulations and tribal permits authorizing the conduct of treaty ceremonial and subsistence whaling.

The Whaling Commission confirms that the whaling captain and crew have met the training guidelines and other applicable requirements for a permit. The Whaling Commission issues whaling permits which must then be approved by the Makah Tribal Council. The tribal whaling permit is issued to the whaling captain. It identifies the whaling captain, date issued, vessels involved, names of crew members, and area where the hunt is authorized. The permit must incorporate all of the requirements of the Tribe's management plan and any additional requirements the Whaling Commission and the Tribal Council deem appropriate. It also must identify conditions that will result in its termination. For example, landing of a gray whale, striking and losing a gray whale, expiration of the permit after 10 days (without a strike or landing), and termination by the Whaling Commission or Tribal Council.

Administrative Services Department provides administrative financial services to the Tribe, including complying with applicable federal, state, and local policies; ensuring effective financial, personnel, procurement, and property management; promoting the highest standards of integrity, impartiality, and professionalism (in conduct of administrative programs); and promoting effective coordination and improved management practices among tribal programs, the Makah Tribal Council, enterprises, and outside agencies.

Tribal Enterprises. There are several separately chartered enterprises: Makah Business Enterprises, Makah Forestry Enterprise, Makah Cultural and Research Center, and Port of Neah Bay/Makah Marina. Makah Business Enterprises "operates within the structure of the Tribe." The other entities operate under independent boards (appointed by Makah Tribal Council).

- **Makah Business Enterprises** is responsible for creating and enhancing a for-profit sector for the betterment of the Makah tribal community. The businesses operating under Makah Business Enterprises are intended to generate profits, develop self-sufficiency, and create employment. As of 2012, five businesses operate under Makah Business Enterprises: Makah Mini-Mart/Fuel Station, Hobuck Beach RV and Cabin Resort, Warmhouse Restaurant, Cape Resort and RV Park, and the transfer station.
- **Makah Forestry Enterprise** focuses on sustainable timber harvests while marketing logs and other forest-related products.
- **Makah Cultural and Research Center** is a nonprofit organization dedicated to revitalizing and preserving Makah culture. Its operations include an archive and research library, a museum, an education department, a language program, and a Tribal Historical Preservation Department that manages cultural properties on the Reservation.
- **Port of Neah Bay** operates the Makah Marina, Marina Conference Center, and the Makah Office of Marine Affairs. The Port manages contracts with two oil spill response contractors to provide 24-hour response coverage and oversees the Big Salmon Fishing Resort lease. The Port's mission is to develop, construct, regulate, and operate facilities and infrastructure for the transportation and industrial needs of the Makah Reservation to create profitable opportunities for tribal and individual businesses through project revenues, bonds, grants, and other sources.

3.1.2.2 Makah Tribal Programs and Management Plans

Through the Makah Tribal Council and tribal departments, the Makah Tribe operates numerous governmental programs under a variety of management plans. Those most relevant to this EIS are described below.

3.1.2.2.1 Makah Public Safety Program

In addition to weapons training, police officer training includes advanced narcotics training, forensics, and critical incident management. In 2005, the Makah Tribal Council adopted the National Management Incident System for response to emergencies that may affect the tribal community. Most emergency situations are handled locally, but major incidents may require assistance from state, county, or federal authorities. The National Management Incident System was developed to better coordinate responders from different jurisdictions and disciplines in the event of natural disasters and emergencies, including acts of terrorism. Benefits include a unified approach to incident management; standard command and management structures; and emphasis on preparedness, mutual aid, and resource management. The website is http://www.fema.gov/emergency/nims/index.shtm.

Using the National Management Incident System template, the Makah Tribal Council adopted an integrated comprehensive emergency plan in 2005. The plan provides for coordinated response and unified command structure under the Makah Director of Public Safety (Police Chief). The handling of any emergency, including civil disturbance, falls under the plan. One example of the plan's implementation occurred in December 2005, when there was a water shortage emergency on the reservation because of a combination of unusual drought and storm damage. In response to the emergency, the Police Chief sought a Makah Tribal Council declaration of emergency, which placed the comprehensive emergency plan in effect. Another example was in July 2010, when the Tribe hosted the Tribal Journeys event and the incident command system used border patrol, state, and other Tribal agencies.

3.1.2.2.2 Makah Fisheries Management Programs

Fisheries in Puget Sound, the Strait of Juan de Fuca, and nearshore coastal waters are co-managed by the Indian treaty tribes and the Washington Department of Fish and Wildlife (WDFW). Ocean fisheries in United States waters are regulated by the Pacific Fishery Management Council with NMFS oversight and approval under the Magnuson-Stevens Act. State and tribal biologists participate in developing the scientific information that guides the decision-making and deliberative processes of the Pacific Fishery Management Council and NMFS. Harvest of salmon is also governed internationally under the 1985 Pacific Salmon Treaty, developed through cooperation by tribes, state governments, United States and Canadian federal governments, and sport and commercial fishing groups. The treaty is implemented by the eight-member bilateral Pacific Salmon Commission, which includes representatives of federal, state, and tribal governments. The Pacific Salmon Commission does not regulate salmon fisheries, but provides regulatory advice and recommendations, and is a forum for the two countries to reach agreement on mutual fisheries issues.

The Makah Tribe regulates and coordinates its own fishery management program within its U&A. The Tribe manages fisheries for salmon, halibut and other bottom fish, rockfish, Pacific whiting, black cod/sablefish, shellfish, and other marine species off the Washington coast, in coastal rivers and bays, and in the Strait of Juan de Fuca.

According to the Makah Fisheries Management 2012 Annual Report (Makah Fisheries Management 2012), the following divisions and programs are under Makah Fisheries Management:

Groundfish Management Program. The Program's primary goal is to protect the Makah Tribe's treaty rights through sustainably managing marine fisheries with emphasis on environmental, economic, and social aspects. The Groundfish Management Program manages the following Makah treaty fisheries: long-line black cod (sablefish) fishery; bottom trawl fishery (dominant species are true cod / Pacific cod, Petrale sole, ling cod, and black cod); mid-water trawl yellowtail rockfish-directed fishery; Dungeness crab pot fishery; Pacific halibut long-line fishery, and mid-water trawl Pacific whiting fishery. Management activities include: participation in international, federal, state, and tribal management forums and processes, including the International Pacific Halibut Commission, the Pacific Whiting Treaty Joint Management Committee, and the Pacific Fishery Management Council; development and implementation of Makah management measures to preserve the resources, allow harvest of target species, and minimize bycatch; promulgation and issuance of regulations; observing, monitoring, and sampling the catch; and development of new fisheries.

Salmon Management Program. The Program's primary goal is to increase harvest opportunities of salmonids for Makah tribal fishermen while protecting, conserving, and enhancing salmonid stocks. The salmon management program manages the following Makah salmonid fisheries: ocean troll fishery, Strait of Juan de Fuca troll fishery, Strait of Juan de Fuca drift gillnet fishery, Strait of Juan de Fuca setnet fishery, and on-Reservation river fisheries. Management activities include participation in international, federal, regional, state, and tribal management forums and processes, including the Pacific Salmon Commission, North of Falcon process, and Pacific Fishery Management Council.

Salmon Field Research and Monitoring. This division conducts field research and data collection on local salmon stocks for use in fishery management, stock assessments, and evaluation of salmon recovery programs. Many of the division's projects are ongoing projects with long-term data sets that can be used to assess population trends over many years. The division's main project areas are Lake Ozette sockeye monitoring, coho smolt out-migration monitoring, adult spawner surveys, and coded wire tag recovery.

Marine Mammal Program. Program staff is responsible for researching and participating in scientific and management forums regarding marine mammals, which are important biological and cultural resources within the Makah U&A. The Tribe's Marine Mammal Biologist attends and participates in the meetings of the International Whaling Commission (IWC) Scientific Committee and its subcommittees, giving primary attention to the Aboriginal Whaling Management Procedure and the Bowhead, Right, and Gray Whale subcommittees and, time permitting, the Stock Definition and Environmental Concerns subcommittees. The tribal staff marine mammal biologist also participates in the Pacific Scientific Review Group, which provides advice to NMFS and USFWS on marine mammal stock assessments and review of sources of mortality. In addition to these activities, the Marine Mammal Program conducts whale research, including research on gray and humpback whale life history through photo-identification and stock structure through the collection of biopsy samples. The Program also participated in a scientific exchange with the Chukotkan Region of the Russian Federation in 2006 to evaluate the logistics of conducting an intensive 'stinky whale' research program. In addition to whale research, the Program's research projects have investigated a wide range of issues, including: Steller sea lion life history, food habits, population counts, and seasonal haul-out use patterns; California sea lion food habits and life history; seasonality and magnitude of domoic acid and saxitoxin concentrations in sea lion scat; metal concentrations in kidney and liver of marine mammals stranded in Washington; river otter food habits; and use of traditional halibut hooks to reduce bycatch. The Program also conducts research regarding the frequency and cause of marine mammal strandings in the Makah U&A and is an active member of the regional stranding network. During 2012, the Program responded to 49 stranded marine mammals on the Makah Reservation and surrounding areas (Makah Fisheries Management 2012). In previous years, this work has included disentangling whales caught in fishing gear. The Program also has an education and outreach function that coordinates internships for Makah youth on fisheries and environmental science and presents information about Makah whaling and whale science in classrooms in Neah Bay and other schools in the region. The Program's activities can change and expand depending on the availability of grant funding.

Scientific Research Program. The primary objective of this program is to conduct scientific research to solve management problems at the request of Makah Fisheries Management managers. Since 2000, the program has used stable isotope analysis to investigate questions on fish early life history, population structure, migration, and climate change. This research has resulted in about 40 publications in national and international scientific journals between 2000 and 2012.

Hatchery Operations Division. The hatchery operations program raises and rears six salmonid stocks, including two stocks of steelhead, two stocks of Chinook salmon, coho salmon, and sockeye salmon. The goals of the program are to: provide harvestable steelhead, coho salmon, and Chinook salmon for tribal and sport fishers; provide coded wire tagged Chinook salmon smolts for the U.S./Canada wild Chinook salmon indicator stock study; increase the range and abundance of Hoko River Chinook salmon; increase the range and abundance of Lake Ozette sockeye salmon; and provide assistance with various salmon research and monitoring projects.

Environmental Division. The primary objective of the Environmental Division is to protect air, marine nearshore, freshwater, and terrestrial environments and resources for ecosystem health and human use. This objective is achieved through the Division's Air Quality Program, Water Quality Program, and Land and Solid Waste and Environmental Health Program. The Division also plays an active role in engaging and monitoring international, national, regional, and local forums on environmental issues affecting the Makah Tribe.

Habitat Division. The primary goal of the Habitat Division is to protect and restore freshwater aquatic resources on the Makah Reservation and within the Makah U&A. Principal activities of this division include participating with other tribal departments regarding planning, development, and resource extraction projects that affect freshwater resources; participating in habitat enhancement with WDFW under the State of Washington Forest Practices Act; identifying, prioritizing, and implementing habitat rehabilitation projects benefiting aquatic habitat on the Makah Reservation and in the U&A; participating in recovery efforts of Lake Ozette sockeye salmon; and developing watershed planning and protection efforts with adjacent communities to protect aquatic resources on the Makah Reservation and U&A.

3.1.2.2.3 Makah Comprehensive Economic Development Strategy

The Makah Tribe's Comprehensive Economic Development Strategy (Makah Tribe 2006b) identifies the Makah Tribal Council as the approving body for economic development within the reservation. The Makah Tribe obtains most of its tribal income through marina and harbor development, Makah Forest Enterprise, and the Makah Business Enterprises.

Goals identified within the plan include the following:

- Determine the feasibility of and priority ranking for seven projects associated with marina and harbor development (marina expansion, haul-out facility, upgraded marine fuel float [for large vessels in the fishing fleet], aquaculture, log dump expansion, Neah Bay Harbor deep-water entry, and cruise ship facility).

- Develop a small business program for ancillary businesses that support, enhance, and fulfill needs associated with the new marina.
- Expand the forested land base for the Tribe.
- Study the feasibility of a marine fish hatchery.
- Provide academic and business training and education.
- Diversify the Makah fishing industry, specifically the whiting fishery.
- Identify new projects consistent with the Makah Tribal Land Use Committee, including a visitor center (that may be associated with an ocean-front cabin resort and motel), road improvements, boardwalk (walking paths on beach side of downtown), trails for tsunami escape ways, walking path, and a new development area that would provide a wellness/medical center, senior citizen apartments, clinic staff housing, baseball fields, and new Makah Tribal Council offices.

Other priorities included in the plan are a new clean water source for tribal use, projects that provide for downtown revitalization, Shi Shi Trail expansion, tribal communications network upgrades, a potential wind generation development, and opportunities to provide value-added seafood processing.

3.1.2.2.4 Makah Living Forest Management Plan

The Makah Living Forest Management Plan (Makah Tribe 2009) identifies goals and objectives for maintaining a desired future condition for the Tribe's forest resources. The intent of the forest plan is to guide harvest of mostly second-growth timber while allowing for harvest of only small, scattered pockets of older timber (exceeding 100 years of age) in an attempt to keep the remaining, large, contiguous blocks of older timber intact. Annual harvests of 8.5 million board feet are expected to achieve this goal, while providing for a long-term sustainable timber harvest level. Approximately 23,437 acres (78 percent of the reservation) are managed for timber harvest. The Tribe has also acquired, and continues to acquire, land off the Reservation for forest management. Timber sale revenues represent approximately 50 percent of non-grant (monies not received through federal grants administered by the BIA) tribal income.

3.2 Water Quality

3.2.1 Introduction

The following section describes the management and existing condition of water resources in the project area. Topics addressed include drinking water sources, shellfish harvest areas, and existing practices for the prevention of and response to spills of fuel and other contaminants. This section also addresses solid waste disposal as it relates to options for disposal of a whale carcass. Ocean currents and nearshore mixing are discussed in Section 3.3 (Marine Habitat and Species).

3.2.2 Regulatory Overview

The federal Clean Water Act (33 USC 1251 *et seq.*) establishes standards and regulations for protecting the quality and beneficial uses of the nation's waterways and regulates navigable waters of the United States. Federal agencies responsible for enforcing the Clean Water Act include EPA and the Army Corps of Engineers. On the Makah Reservation, EPA has delegated authority under sections 303(c) and 401 (both water quality standards and implementation plans and dredge and fill permits) of the Clean Water Act to the Makah Tribe. On the Makah Reservation, Makah Health Code Title III states that "it shall be a violation [of the Health Code] to conduct activities in the watershed which may degrade the physical, chemical, microbiological, viral, or radiological quality of the source of supply." All proposed activities require a written permit from the Tribal Council. EPA has retained some authority over Clean Water Act management on the Makah Reservation and administers programs such as the National Pollutant Discharge Elimination System under section 402.

Off the Makah Reservation, EPA has delegated authority over state waters (including sections 401 and 402) to Ecology, which is responsible for the implementation of the Washington State Water Pollution Control Act (Revised Code of Washington [RCW] 90.48). This law is intended to maintain the highest possible standards for all waters of the state consistent with public health and enjoyment; the propagation and protection of wildlife, birds, game, fish, and other aquatic life; and prevention and control of pollution within waters of the State of Washington. Ecology has set water quality standards to protect the beneficial uses of surface waters. Ecology has established fresh and marine water quality standards for fecal coliform bacteria (an indicator of fecal contamination); dissolved oxygen; total dissolved gas; temperature; pH; turbidity; aesthetics; and toxic, radioactive, and deleterious materials (WAC 173-201A-210).

Ecology routinely collects marine water quality data as part of the long-term Marine Waters Monitoring Program initiated in 1967. Ecology uses these long-term data to assess marine water quality in Washington State, including coastal estuarine areas represented by Willapa Bay and Grays Harbor (Ecology 2012a). The agency uses these data to differentiate inter-annual and seasonal variations from those resulting from human activities at specific locations. Ecology uses the data primarily to maintain the federal Clean Water Act 303(d) list of impaired waterbodies throughout the state, and 305(b), the report describing the overall status of the waters of the state.

3.2.3 Existing Conditions

The primary saltwater resources in the project area include the Pacific Ocean from the mouth of the Strait of Juan de Fuca to the Exclusive Economic Zone (EEZ) boundary and the western portion of the Strait of Juan de Fuca that includes the Makah Tribe's U&A (Figure 3-1). The EEZ extends up to 200 miles (321.9 km) offshore, and coastal states have the right to explore, exploit, and manage within its limits. Freshwater resources in the project area occur in portions of Water Resource Inventory Areas 20 (Soleduck-Hoh) and 19 (Lyre-Hoko), and portions of the Makah Reservation fall within both. Major rivers include the Wa'atch and Sooes Rivers, the two main tributaries that drain into Makah Bay from the Makah Reservation, as well as the Ozette River, which runs from Ozette Lake to the nearshore area of the Olympic National Park (Figure 3-2). These rivers all occur in Water Resource Inventory Area 20. Numerous additional smaller streams in the project area drain to the Pacific Ocean, the Strait of Juan de Fuca, and Neah Bay. Based on information Ecology provided, these waterbodies have extraordinary water quality, and none of the designated uses (shellfish harvesting, primary contact recreation, wildlife habitat, harvesting, commercial navigation, boating, and aesthetics) is restricted (WAC 173-201A-210).

Ecology implements marine water quality management activities in Puget Sound and the outer coastal estuaries based, in part, on periodic quantitative water quality monitoring data. The data are also used for interdisciplinary efforts aimed at assessing the health of marine ecosystem components, ranging from eelgrass to salmon, because these organisms live in and are affected by marine water and its quality.

Ecology has not listed the Pacific Ocean, the Strait of Juan de Fuca, Neah Bay, or any of the rivers and streams within the project area as impaired for water or sediment quality parameters. These parameters generally include temperature, dissolved oxygen, pH, nutrients, bacteria, metals, and toxic substances (WAC 173-210A-210). In addition, Ecology and the Washington Department of Health have monitored for fecal bacteria through the BEACH program at six beaches in the Makah U&A: Dakwas Park Beach, Front Street Beach, East Hobuck Beach, Sooes Beach, Third Beach, and Warmhouse Beach (Figure 3-2). Of the nearly 2,500 samples taken between 2010 and 2013, fecal bacteria levels (*Enterococcus*) exceeded the EPA's water quality limits on just 35 occasions with half of these from sampling sites at Dakwas Park Beach in Neah Bay (Ecology 2013a).

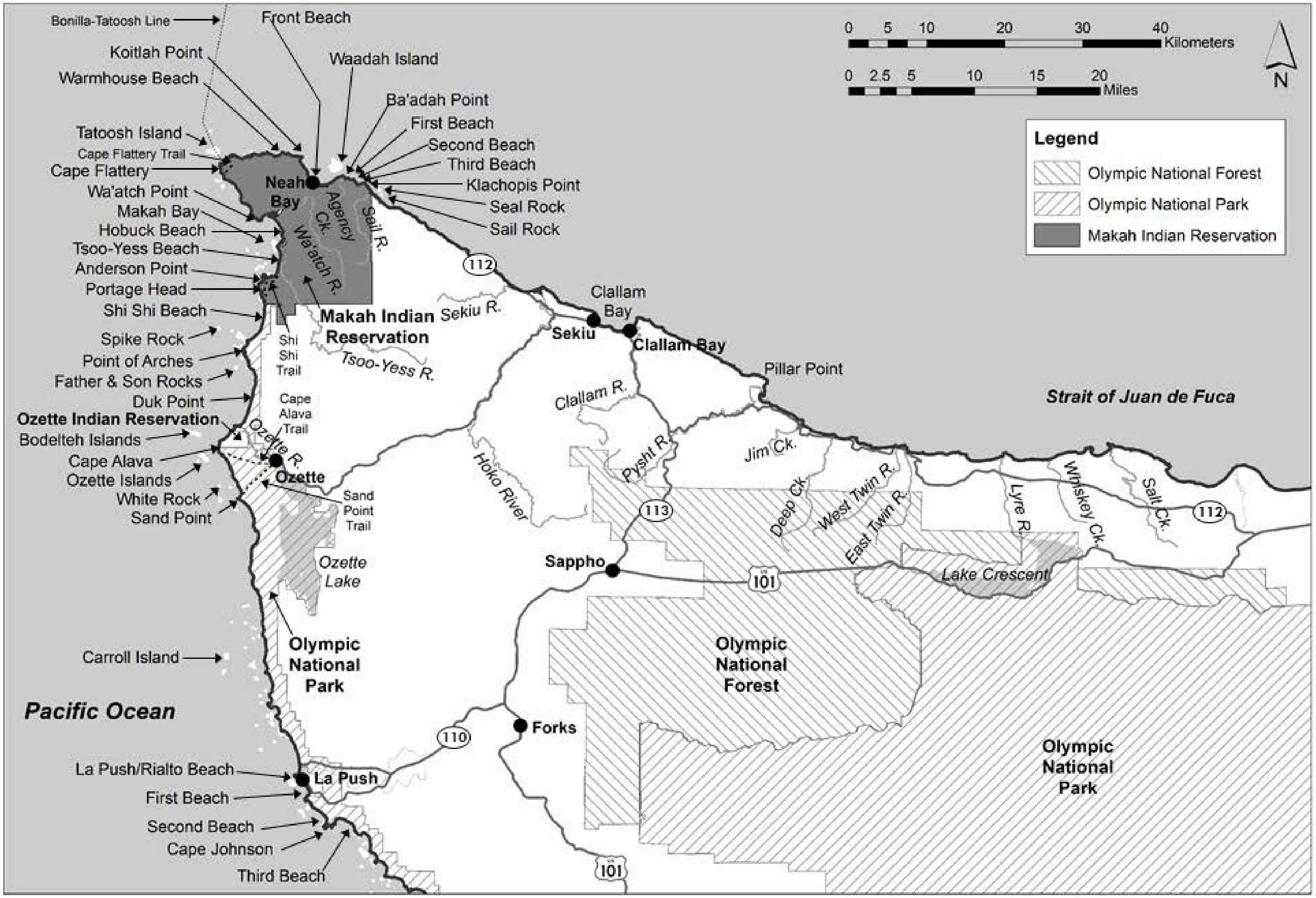

Figure 3-2. Topographic features of interest.

3.2.4 Drinking Water Sources

Drinking water sources for the Makah Reservation (with three primary settlement areas) are local rivers and the Educket Reservoir (United States Bureau of Reclamation 2006). The difficulties in collecting and distributing water suitable for drinking led to a moratorium on residential and commercial building on the reservation in 2000. In 2006, a drought resulted in the Makah Tribal Council issuing a state of emergency for Neah Bay, and the dependence upon the U.S. Army to provide water to the reservation via a diesel powered desalinization system. The Bureau of Reclamation is considering the following options for increasing the availability of drinking water for current use and planned growth:

- Reclamation of Educket Reservoir
- Development of an additional collection system from three creeks along Cape Flattery
- Construction and operation of a reverse osmosis desalinization plant that would collect water from the Wa'atch River intertidal zone south of the existing tribal center through an underground collection system near the outlet of the Wa'atch River

3.2.5 Shellfish

The Washington Department of Health regularly monitors shellfish areas because shellfish tend to accumulate pollutants and generally reflect long-term (chronic) water quality concerns (Washington State Department of Health 2012a). This information supplements the periodic samples Ecology takes at discrete water quality monitoring stations. The state Surface Water Quality Standards also contain criteria to reduce the chance of people becoming ill from eating shellfish or from swimming or wading in waters of the state. Makah Fisheries and the Makah Port Authority also monitor shellfish for contamination. Managers can close shellfish beds to human harvest for two reasons: the presence of human fecal coliforms (typically from failing septic systems) and toxic algal blooms. Fecal coliforms are used as indicators of contamination. Although generally not harmful themselves, they indicate the possible presence of pathogenic (disease-causing) bacteria, viruses, and protozoans that live in the digestive systems of humans and other animals (EPA 1997). Toxins associated with algal blooms include domoic acid, saxitoxin, and gonyautoxin derivatives. These naturally occurring neurotoxins may be harmful if consumed in significant concentrations, which can occur when people eat crabs or shellfish that have accumulated toxins by feeding on toxic algae.

Neither WDFW nor the Washington Department of Health has identified or mapped any recreational or commercial shellfish beds within the project area along the Pacific Ocean (WDFW 2015). Subsistence shellfish gathering takes place at Neah Bay, Makah Bay, and other relatively rocky areas on the reservation. Butter clams, steamer clams, and cockles are gathered on the west and east ends of Neah Bay. A horseclam bed occurs on Front Beach, near where the gray whale was landed in 1999. A pilot project by Makah Fisheries Management with geoduck aquaculture is also underway on Front Beach. Additional species, such as mussels, are gathered in intertidal rock areas throughout the reservation. The only commercial activity associated with this shellfish gathering is limited local selling.

In 2008, the Washington Department of Health conducted a Sanitary Survey of Neah Bay (Washington State Department of Health 2008). This survey is conducted as part of a routine 12-year evaluation of the Neah Bay commercial shellfish growing area. Shoreline survey information and water quality data indicated that Neah Bay meets the criteria for an Approved classification. A prohibited area was established to accommodate the marina/moorage area and an unclassified area exists in the northwest portion of the bay. The Sanitary Survey also noted that the major potential sources of pollution in Neah Bay include the overboard discharge of sewage by boats, stormwater, and animals. However, none of these were cited as having had a significant adverse impact on water quality in Neah Bay and the survey noted that elevated bacteria levels in water samples are infrequent and random (except for one site in the prohibited area adjacent to the marina).

In general, the beaches located within the project area are hotspots for algal blooms, at least partially because of the nutrient-rich waters and mixing that occur at the mouth of the Strait of Juan de Fuca (WDFW 2004). Algal blooms are triggered by a complex interaction of environmental conditions, and the duration and timing of closures are difficult to predict. For example, the Washington Department of Health closed shellfish harvesting in the southern portions of Neah Bay in 2005 because of potential pollution (primarily fecal coliform) associated with a sewer outfall and marina located in this area (Washington State Department of Health 2005). By summer 2006, however, most shellfish harvest was open (WDFW 2006a). In 2005, the Department of Health also closed waters along the Pacific Ocean within the project area because of the results of biotoxin tests (Washington Department of Health 2005). The most recent review of fecal coliform samples by the Washington Department of Health classified Neah Bay as meeting the water quality standards of the National Shellfish Sanitation Program of the U.S. Food and Drug Administration (Washington State Department of Health 2012a).

3.2.6 Spill Prevention

The project area includes national and international shipping lanes and is open to recreational boating and commercial and recreational fishing. Wherever marine vessels are present, there is a risk that pollutants from boat emissions and/or spills will enter the water. However, as discussed above, Ecology has not listed any of the waters of the project area as impaired for water or sediment quality parameters; however, some impairment of marine waters has occurred during major spill events.

Currently, several organizations are prepared to respond to emergency spills in Puget Sound, the Strait of Juan de Fuca, and off the Washington coast (Ecology 2003). These organizations include National Response Corporation Environmental and Marine Spill Response and Clean Sound Cooperative. As part of Ecology's Spill Prevention, Preparedness, and Response Program, it stations a rescue tug in Neah Bay seasonally to assist tankers and cargo ships that are drifting or need support during bad weather (Ecology 2005). In general, these pollutants (such as hydrocarbons) are associated with gasoline and diesel engines used by transiting vessels, and they enter the environment from spills and/or exhaust. Smaller oil spills could occur during fueling and maintenance operations at docks.

The nearshore portion of the Makah U&A corresponds largely with the designated area to be avoided for the OCNMS. This designation is meant to reduce the potential for catastrophic oil spills by encouraging big ships (carrying large amounts of bunker fuel) to avoid the nearshore areas of the coast. While this designated area does not encompass the entire OCNMS, its boundaries protect sanctuary resources most at risk from vessel casualties, while being compatible with existing vessel traffic lanes (Galasso 2000). See Subsection 3.1.1.1.3, Olympic Coast National Marine Sanctuary, Current Issues, Area to be Avoided, and Subsection 3.13.2, Transportation, Regulatory Overview.

3.2.7 Solid Waste Disposal

Until recently, there was a landfill at Neah Bay (the Warmhouse Beach dump site) used solely by residents and businesses on the Makah Reservation. The facility, under the jurisdiction of the Makah Tribal Council, was the only landfill in Clallam County that accepted municipal solid waste (Parametrix 2007). In the 1980s, a solid waste management plan for the Makah Reservation recommended closure of the dump site and construction of a transfer station to haul waste to the closest permitted disposal facility (Paul S. Running and Associates 1983). The dump site had been used in the past by the U.S. Department of Defense and other federal agencies to dispose of hazardous waste (including asbestos, batteries, pesticides, paints, and waste oil), some of which is leaching into a nearby stream and waters of the Strait of Juan de Fuca (Greene 2013). A comprehensive solid waste management plan update prepared for Clallam County indicated that siting a new municipal solid waste landfill in Clallam County is not feasible because of various factors, including climate, geography, land use, and the availability of a lower-cost option to export waste (Parametrix 2007). In the fall of 2012, the tribe opened a new solid waste transfer station in Neah Bay and closed the Warmhouse Beach dump site (Greene 2013). The new Makah Transfer Station includes a number of features aimed at recycling and sustainability, including sites to collect recyclable materials (e.g., paper, metal, and plastic) and collect hazardous wastes for proper disposal, and natural stormwater controls that capture water and filter sediments in natural vegetated swales, channels, and ponds before allowing it to seep into the adjacent wetlands (Ridolfi 2013). Waste from the Makah Transfer Station is eventually transported in containers via truck and railway to the Roosevelt Landfill in Klickitat County, Washington (J. Garcelon, Clallam County Environmental Health Specialist, pers. comm., November 27, 2013).

On May 24, 2013 (78 Fed. Reg. 31464), the U.S. Environmental Protection Agency (EPA) proposed to add the Warmhouse Beach dumpsite to the General Superfund section of the National Priorities List. A final listing of this site could prompt further investigations regarding the health and environmental risks of this site as well as possible remedial actions that might be financed under the Comprehensive Environmental Response, Compensation, and Liability Act. The EPA has received a letter of support for placing this dumpsite on the National Priorities List from the Makah Tribe, which considers cleanup of the dump its highest environmental priority (EPA 2013).

Given that the Warmhouse Beach site is now closed, it is highly unlikely that any whale carcass remains would be brought there for disposal. It is possible that some remains could be brought to the new transfer station; however, this too is unlikely given the high costs of shipping to a landfill. The Tribe may choose to allow unused portions of the whale carcass to decompose at the beach landing site or at other land-based sites, especially if there was interest in retrieving the whale bones after natural decomposition had made them more suitable for handicraft. It is most likely that whale carcass remains would be disposed of in deep marine waters of the Strait of Juan de Fuca or the Pacific Ocean. Doing so would lessen the chance for adverse water quality impacts in nearshore waters (e.g., impairment of shellfish growing areas) as well as in the vicinity of the transfer stations (e.g., via decomposition and seepage).

The two primary generators of animal carcasses in Clallam County are the Humane Society (in Port Angeles) and Battelle Marine Sciences Laboratory (near Sequim). Both organizations use Petland Crematorium in Aberdeen for cremation of animals. Battelle sends hazardous carcasses to Pacific Marine Laboratory for disposal. The Clallam County Road Department buries roadkill carcasses at remote locations on public lands scattered throughout the county (Parametrix 2007).

3.3 Marine Habitat and Dependent Species

3.3.1 Introduction

The marine environment off the coast of Washington is highly energetic, productive, and dynamic, supporting a wide range of invertebrates, fish, and marine wildlife. The ecological importance of the habitat was acknowledged in the OCNMS designation (NOAA 1993). High biological productivity, diversity of habitats, the wide variety of marine mammals and birds living in or migrating through the area, and the presence of endangered and threatened species and essential habitats were identified as some of the biological resources giving the Sanctuary particular value (refer to Subsection 3.1.1.1, Olympic Coast National Marine Sanctuary, for more detail). The dynamic physical processes and high levels of disturbance experienced along the Washington coast, including the project area, affect ecosystem structure, ecological interactions, and species' recruitment dynamics. Understanding the physical processes in the project area will inform the analysis of potential direct and indirect effects to the ecosystem from activities associated with the proposed whale hunt.

The description of the marine ecosystem that follows is organized by pelagic environment (open water column) and benthic environment (bottom substrata), identifying physical features and processes and biological resources associated with each environment. ENP gray whales and other marine wildlife in the project area are described in more detail in other sections (Section 3.4, Eastern North Pacific Gray Whale, and Section 3.5, Other Wildlife Species).

3.3.2 Regulatory Overview

The conservation, preservation, and management of marine habitat and biological resources in the project area occur under several statutory and regulatory authorities, the most pertinent of which are detailed below.

Under federally granted Coastal Zone Management Act authority, Ecology administers Washington State's coastal zone management program on the state's shoreline (under the Shoreline Management Act) and waters (under the Aquatic Management Act), except for excluded federal lands (i.e., lands that the federal government owns, leases, or holds in trust, such as the Olympic National Park coastal strip and the Makah and Ozette Reservations, and other lands the use of which is subject to the sole discretion of the federal government).

Under the National Marine Sanctuaries Act and regulations, marine plants and algae, invertebrates, plankton, and fish are protected and conserved as Sanctuary resources within the boundaries of the OCNMS. Federal designation and management of the OCNMS and protection of Sanctuary resources by NOAA's National Marine Sanctuaries Program under the National

Marine Sanctuaries Act, including protection and management of habitat such as bottom formations and substratum, is described above in Subsection 3.1.1.1, Olympic Coast National Marine Sanctuary. Federal designation and management of the rocks and islands that compose the Washington Islands National Wildlife Refuges are also described above in Subsection 3.1.1.2, Washington Islands National Wildlife Refuges.

The PFMC and NMFS are the primary federal management authorities for managing and conserving living marine resources, including marine fish and plants, out to 200 miles (322 km) from shore under the Magnuson-Stevens Act and the North of Falcon planning process. Northwest Indian tribes and WDFW also participate in fisheries management. Under the Magnuson-Stevens Act, NMFS and the PFMC also protect habitat identified as essential for commercially important fish species. Essential fish habitat is defined under the Magnuson-Stevens Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 USC 1802 Section 3(10)). Regulatory guidelines elaborate that the words 'essential' and 'necessary' mean that essential fish habitat should be sufficient to "support a population adequate to maintain a sustainable fishery and the managed species' contributions to a healthy ecosystem." The PFMC describes essential fish habitat in its fishery management plans, minimizes impacts to essential fish habitat resulting from fishing activities, and consults with NMFS about activities that might affect essential fish habitat. The council may use fishing gear restrictions, time and area closures, harvest limits, and other measures to lessen adverse impacts on essential fish habitat. The Magnuson-Stevens Act also encourages NMFS to designate habitat areas of particular concern. These are specific habitat areas, a subset of the much larger area identified as essential fish habitat, that play a particularly important ecological role in the fish life cycle or that are especially sensitive, rare, or vulnerable. Designating habitat areas of particular concern allows the PFMC and NMFS to focus their attention on conservation priorities during review of proposals, affords those habitats extra management protection, and gives the fish species within these areas an extra buffer against adverse impacts.

Under the ESA, NMFS and USFWS are responsible for the conservation of threatened and endangered species, including fish, wildlife, and plants under their jurisdiction. The agencies are required to identify and designate critical habitat for threatened and endangered fish and wildlife species under their jurisdictions. Critical habitat is 1) specific areas within the geographical area occupied by the species at the time of listing if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and 2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. Under section 7 of the ESA, all federal agencies must ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species, or destroy or adversely modify its designated critical habitat. These complementary requirements apply only to federal agency actions, and the latter apply only to habitat that has been designated. A critical habitat designation does not set up a preserve or refuge; it applies only when federal funding, permits, or projects are involved.

3.3.3 Existing Conditions

3.3.3.1 Pelagic Environment

The term ‘pelagic’ is commonly used in reference to the upper water column of the open ocean that is not in association with the ocean bottom or bathymetric features. The oceanographic processes in the project area are generally large in scale, with ocean circulation driven by a major eastern boundary current system, the California Current System. Local conditions are energetic, dynamic, and affected by oceanographic processes operating across a spectrum of temporal and spatial scales. These physical processes and their pronounced effects on the area’s biota are described in the following sections.

3.3.3.1.1 Physical Features and Processes

Large-scale Ocean Currents

The project area on the Washington coast is situated in an eastern boundary current system where the North Pacific Current divides into the northward flowing Alaska Current and the California Current System to the south (Hickey 1998; Gramling 2000). The California Current System is composed of the California Current, the California Undercurrent, the wintertime Davidson Current, and possibly a subsurface Washington Undercurrent. The relative strength of these currents and their influence on the temperature, salinity, flow, and productivity of the project area varies considerably over seasonal and interannual time scales (Hickey 1998; Hickey and Banas 2003; MacCall et al. 2005). The components of the California Current System are described below, along with discussion of how they contribute to the dynamic physical environment of the project area.

The California Current extends up to 600 miles (966 km) offshore and ranges from the Pacific Northwest south to Baja California (Hickey 1979; Miller 1996; Hickey 1998; Burtenshaw et al. 2004). The California Current is a major force in shaping local ecosystems by affecting upwelling, downwelling, and biological production along the Pacific coast (Airamé et al. 2003). Despite being one of the most studied oceanographic systems in the Pacific Ocean, the mechanisms underlying the variability of this meandering current are still obscurely understood and inadequately sampled (Miller 1996). Flow of the California Current is strongest in the summer and early fall and weakest in the winter (Hickey 1998; Gramling 2000; Hickey and Banas 2003). The California Current is strongly affected by seasonal wind forcing (Thomas et al. 2003), and shifts in regional climate can have dramatic effects on its flow (e.g., during El Niño events, the flow of the California Current is unusually weak) (Hickey 1979; Gramling 2000). For further description of El Niño events, see El Niño Southern Oscillation Cycle below in this subsection.

The California Undercurrent is a permanent, relatively narrow (6- to 25-mile/9.6- to 40.2-km), deep subsurface feature that flows northward over the continental slope from Baja California to Vancouver Island (Reed and Halpern 1976; Hickey 1998; Neander 2001). The California Undercurrent transports warm, saline, low-oxygen, equatorial water to the northern Pacific, with strongest northward flows in the summer or early fall and minimum flows in the spring (Hickey 1998; Neander 2001; Hickey and Banas 2003). During El Niño years, when flow of the California Current is weakened, the California Undercurrent is unusually enhanced (Hickey 1979; Gramling 2000).

The Davidson Current is an inshore, seasonal, northward flowing feature that develops when the southward flowing California Current is weaker and situated further offshore. The Davidson Current is approximately 60 miles (97 km) wide, extends seaward of the continental slope, and transports warm, saline, low-oxygen, high-phosphate, equatorial water to the north (Gramling 2000; Hickey and Banas 2003). The Davidson Current develops along the Washington coast in September, is well established in January, and dissipates by May (Purdy 1990; Hickey and Banas 2003). The strongest flow of the current occurs during the winter months (Hickey and Banas 2003). There is speculation that the Davidson Current is a surface expression of the California Undercurrent (Hickey 1979).

There is some indication that a southward undercurrent, the Washington Undercurrent, occurs over the continental slope of Washington and Oregon in the winter (Werner and Hickey 1983; Purdy 1990). This undercurrent is located 1,000 to 1,600 feet (305 to 488 m) deep, deeper than the northward-flowing California Undercurrent (Hickey 1998; Hickey and Banas 2003).

Dynamic Processes and Variability

Seasonal Variability, Upwelling, and Downwelling

Seasonal variations in the oceanography of the project area occur in response to various forcing events, including solar heating and cooling, wind mixing, freshwater runoff, and coastal upwelling (Brueggeman et al. 1992). The seasonal pattern of the physical environment is typified by periods of intense coastal upwelling (April through September) and periods of relaxed winds (October through March) punctuated by strong winter storms (November to March).

Upwelling is a wind-driven, dynamic process that brings nutrient-rich deep water to the surface and transports nutrient-poor surface waters offshore (Mann and Lazier 1991). During spring and summer, northwesterly winds and the earth's rotation combine to push the surface waters offshore. This, in turn, results in the movement of deeper cold water upward into surface waters, introducing nitrate, phosphate, and silicate nutrients essential for phytoplankton production. Periods of wind relaxation lasting 2 to 6 days may alternate with upwelling-favorable conditions during the spring, contributing to dynamic and patchily distributed nutrient availability and productivity. The strongest upwelling in the project area occurs during July and August (Brueggeman et al. 1992; Airamé et al. 2003). Prolonged periods of wind relaxation may occur from late summer to early fall. The timing and intensity of regional upwelling varies from year to year (Huyer et al. 1979; Strub and James 1988; Bograd et al. 2009) and with changes in long-term climatic phenomena (El Niño Southern Oscillation Cycle and Pacific Decadal Oscillation in this section, below) (Huyer and Smith 1985; Barth and Smith 1997).

In October or November, there is a shift in wind direction that results in predominant winds that flow from the east/southeast (Norman et al. 2004), resulting in the onshore transport of surface waters and the conditions typical of fall and winter that favor downwelling (Hickey 1998). During periods of diminished upwelling or downwelling, the survivorship and reproductive success of planktivorous invertebrates and fishes decrease in response to reduced plankton abundance and productivity (Airamé et al. 2003; Bograd et al. 2009). Between late November and mid-March, low pressure systems from the Gulf of Alaska generate strong winter storms, southerly winds, and large waves in the Pacific Northwest (Strub and Batchelder 2002; Airamé et al. 2003). These winter storms create intense vertical mixing, usually persist for only a few days, and are important sources of localized oceanographic disturbance.

Eddies and Fronts

During the spring, the large counterclockwise Juan de Fuca Eddy (or Tully Eddy) (Tully 1942) develops offshore of northern Washington at the mouth of the Strait of Juan de Fuca (Burger 2003; Hickey and Banas 2003). The eddy forms as a result of the interaction between effluent from the Strait of Juan de Fuca, southward wind-driven currents along the continental slope, and the bathymetry of the region (Hickey and Banas 2003). At its maximum, the eddy has a diameter of approximately 30 miles (48 km), and it is the dominant circulation pattern off northern Washington until its decline in the fall (Freeland and Denman 1982; Hickey and Banas 2003). The eddy upwells deep, cold, nutrient-rich water into surface waters, resulting in locally enhanced biological productivity (Freeland and Denman 1982; Thomson et al. 1989; Freeland 1992).

Ephemeral eddies and offshore filaments of variable duration (days, weeks, months, years) are also generated by meanders of the California Current, bathymetric features, and coastal upwelling events. Such ephemeral features are most common during summer and fall in the California Current System (Huyer et al. 1998; Barth et al. 2000; Strub and James 1988; Ressler et al. 2005). As with the Juan de Fuca Eddy, ephemeral counterclockwise eddies stimulate enhanced productivity by drawing cooler, nutrient-rich waters to the surface, while clockwise eddies are associated with warmer, nutrient-poor, and less productive conditions. Ephemeral eddy-like features are also generated by the Columbia River plume (see Columbia River Plume below in this section) (Yankovsky et al. 2001; Berdeal et al. 2002). Subsurface eddies are generally observed within and overlying submarine canyons off the Pacific coast (Hickey and Banas 2003), providing an effective mechanism for locally increased productivity and the suspension of sediment and organic detritus over these features (Hickey 1995).

Oceanic ‘fronts’ are zones of high water property gradients (e.g., gradients in temperature, salinity, and nutrients). Ephemeral fronts often exist at the interface between upwelled water and ambient coastal water, and the onset and relaxation of upwelling may result in the cross-shelf transport of planktonic organisms associated with these gradients. Persistent fronts tend to occur regularly at certain locations along the coast (e.g., capes and points) and may extend 60 miles (97 km) offshore (Short 1992). Ephemeral fronts generated off of Vancouver Island may extend southward off of the Washington coast near the project area (Freeland and Denman 1982).

<u>*Columbia River Plume*</u>

The Columbia River plume, through its influence on sea surface salinity, has a major effect on the coastal oceanography of the Pacific Northwest, including the project area. In general, salinity increases southward along the Pacific coast (Hickey and Banas 2003). However, the low-salinity plume of freshwater discharge from the Columbia River constantly changes direction, depth, and width in response to variation in discharge and fluctuations in local wind strength and direction (Hickey et al. 1998; Berdeal et al. 2002; Hickey and Banas 2003). In spring and summer, the plume moves southward, well offshore of the Oregon shelf (Hickey and Banas 2003) and has no influence on the coastal oceanography of the project area. During the winter, however, the plume flows northward and can generate local currents with magnitudes on the order of wind-driven currents in the near-surface layer (Hickey et al. 1998). In addition to seasonal variability, the structure and magnitude of the Columbia River plume has significant interannual and long-term variability (Hickey and Banas 2003). For example, in years of high snowmelt in the Pacific Northwest, fresh water generated from the plume can influence coastal oceanography for prolonged periods.

El Niño Southern Oscillation Cycle

El Niño Southern Oscillation events (including both El Niño and La Niña events) produce extreme interannual anomalies in global climate, atmospheric circulation, and oceanographic processes (Jacobs et al. 1994; Schwing et al. 1996). El Niño Southern Oscillation conditions typically last 6 to 18 months, although they can persist for longer periods (Barber and Chavez 1983; Lynn et al. 1998; Durazo et al. 2001; Schwing et al. 2002a; Schwing et al. 2002b). El Niño conditions occur when unusually high atmospheric pressure develops over the western tropical Pacific and Indian Oceans, and low sea level pressures develop in the southeastern Pacific (Trenberth 1997; Conlan and Service 2000). The trade winds consequently weaken in the central and west Pacific, reducing the normal east to west surface water transport. Upwelling along South America decreases, resulting in shoaling of the thermocline[1], increased sea surface temperatures, and diminished productivity across the mid to eastern Pacific (Donguy et al. 1982). Rainfall patterns also shift eastward across the Pacific, resulting in increased (sometimes extreme) rainfall across the southern United States and Peru (Conlan and Service 2000). La Niña is the opposite phase of El Niño in the El Niño Southern Oscillation Cycle. La Niña is characterized by strong trade winds that push the warm surface waters back across to the western Pacific (Schwing et al. 2000). Under these conditions there is increased upwelling along the eastern Pacific coastline, the thermocline in the eastern Pacific becomes shallower, and there is increased upwelling and productivity.

Although the direct effects of El Niño Southern Oscillation events are observed in the equatorial latitudes, significant correlations exist between the climate of the Pacific Northwest and El Niño/La Niña events (e.g., Pulwarty and Redmond 1997; Cayan et al. 1999). In the Pacific Northwest, El Niño events are characterized by increases in ocean temperature and elevated sea

[1] A thermocline is the depth where water temperature changes relatively rapidly and separates less dense, warmer waters from denser, colder waters.

level (4 to 12 inches/10.2 to 30.5 cm), enhanced onshore and northward flow, and reduced coastal upwelling (Crawford et al. 1999; Smith et al. 1999; Freeland 2000; Airamé et al. 2003). Historically, the region was impacted by strong El Niño events in 1940, 1958, 1983, 1992, 1997 to 1998, and 2004 to early 2005 (Hayward 2000; Lyon and Barnston 2005). The 1997 to 1998 El Niño was one of the largest ocean perturbations in the historical record, inducing a 4° to 5° Fahrenheit (F) (2.2° to 2.8° Celsius [C]) warming of sea surface temperatures over the historical average and profoundly affected the productivity and marine ecology of the region (Castro et al. 2002; Airamé et al. 2003; Childers et al. 2005; Zamon and Welch 2005). This El Niño was immediately followed by an equally strong, cold La Niña event in 1999. While the effects of such events can be conspicuous in the water column, Paine (1986) noted that they may be masked or diluted for the benthic community. For the ENP gray whale, Subsection 3.4.3.3, Distribution and Habitat Use, discusses the effect of oceanic climatic cycles, including El Niño/La Niña events, on gray whale distribution and habitat use; and Subsection 3.4.3.4.2, Stranding Data, discusses the potential relationship between the 1997 and 1998 El Niño events and the ENP gray whale unusual mortality event.

Pacific Decadal Oscillation

The Pacific Decadal Oscillation is a long-term (approximately every 20 to 30 years) climatic pattern correlated with alternate regimes of sea surface temperature, surface winds, and sea level atmospheric pressure (Mantua 2002; Mantua and Hare 2002). The Pacific Decadal Oscillation is often described as a long-lived, El-Niño-like pattern of Pacific climate variability with both warm and cool phases (Mantua 2002; Mantua and Hare 2002; Airamé et al. 2003; Minobe et al. 2004). There are, however, noteworthy distinctions between the Pacific Decadal Oscillation and El Niño Southern Oscillation-induced events: (1) Pacific Decadal Oscillation regimes can persist for 20 to 30 years, in contrast to the comparatively shorter duration of El Niño Southern Oscillation events (typically up to 18 months) (Minobe 1997; Minobe 1999; Hare and Mantua 2000; Mantua and Hare 2002); (2) the ecosystem effects of the Pacific Decadal Oscillation are more pronounced in temperate latitudes (Hare and Mantua 2000); and (3) the mechanisms controlling the Pacific Decadal Oscillation are unknown, while those underlying El Niño Southern Oscillation variability have been well resolved (Mantua and Hare 2002). During warm Pacific Decadal Oscillation regimes, the western and central North Pacific Ocean typically exhibit cold sea surface temperature anomalies, while the eastern Pacific (including the project area) exhibits above-average temperatures and reduced productivity. The opposite conditions exist during cool Pacific Decadal Oscillation regimes. The Pacific Decadal Oscillation has been correlated with markedly different regimes of Columbia River discharge (Mantua et al. 1997), ocean productivity, zooplankton species composition, and forage fish and salmonid recruitment in the Pacific Northwest (e.g., Hare et al. 1999; Tanasichuk 1999; Botsford 2001; Mueter et al. 2002; Gustafson et al. 2006). The Pacific Decadal Oscillation regime shifts are abrupt, with observed shifts occurring in 1925, 1947, and 1977 (Hare 1996; Minobe 1997). The most recent shift, from a warm to a cool phase, occurred in 1998 (Airamé et al. 2003; Peterson and Schwing 2003; Childers et al. 2005; Gómez-Gutiérrez et al. 2005). For the ENP gray whale, Subsection 3.4.3.3, Distribution and Habitat Use, discusses the effect of oceanic climatic cycles, including the Pacific Decadal Oscillation, on gray whale distribution and habitat.

3.3.3.1.2 <u>Biological Resources</u>

Phytoplankton

The biological productivity and composition of the project area is best characterized as diverse, variable, and patchily distributed owing to the dynamic physical processes described above which vary across a spectrum of temporal and spatial scales. Phytoplankton (freely floating photosynthetic organisms) are responsible for the bulk of the primary production in the ocean (the conversion of inorganic carbon to organic matter) and form the basis of the pelagic ecosystem. The distribution and concentration of phytoplankton are affected by ocean currents, vertical mixing, and the rate of photosynthesis. The intensity and quality of light, the availability of nutrients, and seawater temperature all influence rates of photosynthesis (Valiela 1995). The Pacific Northwest coast supports high phytoplankton production, stimulated by the upwelling of nutrient-rich waters and retention of phytoplankton by local oceanographic currents and bathymetric features (Sutor et al. 2005). In general, the Washington coast experiences two seasonal peaks in phytoplankton production; the first occurs from February to April, and the second occurs in October. There is, however, considerable spatial and temporal variability in the production and distribution of phytoplankton caused by the physical oceanographic processes described above. For example, during an El Niño event, less upwelling occurs along the Pacific Northwest coast, fewer nutrients are available for phytoplankton growth, and phytoplankton concentration may decrease by as much as 70 percent compared to an average year (Wheeler and Hill 1999; Thomas and Strub 2001).

In addition to controlling the distribution and concentration of phytoplankton, physical oceanographic processes also affect the species and size composition of phytoplankton in the water column. For example, the onset and relaxation of upwelling events result in dramatic shifts in the phytoplankton community within the California Current System. Newly upwelled water along the shelf is composed chiefly of high concentrations of large, chain-forming diatoms. Following upwelling events, the phytoplankton community is predominantly composed of reduced concentrations of small phytoplankton species (less than 5 microns in size) (Sherr et al. 2005) better adapted to survival in low-nutrient conditions. Similarly, during low productivity conditions induced by El Niño events, 80 to 90 percent of the phytoplankton community along Pacific Northwest shelf waters consists of these smaller phytoplankton species (Corwith and Wheeler 2002; Sherr et al. 2005).

Zooplankton

Zooplankton are a taxonomically diverse group of organisms that consume phytoplankton (as well as other zooplankton). Juvenile crabs (megalopae), copepods, amphipods, euphausiids, and chaetognaths tend to dominate the near-surface zooplankton community (Peterson 1997; Reese et al. 2005; Swartzman et al. 2005). The distribution of zooplankton along the coastline can be described as spatially and temporally patchy, reflecting the variable concentration and distribution of phytoplankton prey, as well as the underlying dynamic physical environment (Reese et al. 2005; Ressler et al. 2005). The highest zooplankton concentrations typically are found within 90 miles (145 km) of the coastline (Swartzman and Hickey 2003; Ressler et al. 2005; Swartzman et al. 2005) in the upper 66 feet (20 m) of the water column over the inner and mid shelf (Peterson and Miller 1975; Peterson and Miller 1977). Zooplankton densities along the Pacific Northwest are highly seasonal, with summer densities ten times greater than those observed during the winter months (Burger 2003; Reese et al. 2005). Copepods form the largest fraction of the zooplankton biomass. Although smaller copepods are numerically dominant (e.g., *Acartia* spp.), larger copepods make up most of the zooplankton biomass (e.g., *Calanus* spp.) (Strickland 1983) and tend to feed on the diatoms that dominate under upwelling conditions. Euphausiids, amphipods, and mysids are also important components of the zooplankton assemblage (Strickland 1983). Ephemeral, seasonal, interannual, and interdecadal physical oceanographic processes (described above) largely control the abundance, distribution, and species composition of zooplankton in the region (e.g., Batchelder et al. 2002; Botsford 2001; Peterson 1999; Peterson and Miller 1977; Peterson and Keister 2003; Tanasichuk 1999; Bograd et al. 2009).

Fish and Invertebrates

The productivity of the project area is strongly affected by the California Current System and the dynamic physical oceanographic processes that induce variability within the California Current System, as noted in Subsection 3.3.3.1.1, Physical Features and Processes, Large-scale Ocean Currents. The high productivity of the region produces a diverse plankton community that, in turn, supports a large assemblage of pelagic marine fish and invertebrates dependent upon this spatially and temporally patchy planktonic food supply (e.g., diatoms, dinoflagellates, copepods, euphausiids, and other organisms). Marine fish and invertebrate species associated with the pelagic environment include coastal pelagics, salmonids, and highly migratory species (Table 3-1). Various physical features within the project area such as ocean currents, upwelling, the Columbia River plume, fronts, and eddy features influence the distribution and abundance of pelagic prey species, as well as that of their fish and invertebrate predators (Doyle 1992; Dower and Perry 2001; Nasby-Lucas et al. 2002; Williams and Ralston 2002; Bosley et al. 2004; Emmett et al. 2004; Emmett et al. 2006). The distribution and abundance of pelagic fish and invertebrate species also are profoundly affected by interannual and interdecadal climatic variations such as El Niño/La Niña or the Pacific Decadal Oscillation (Hickey 1993). For example, dramatic changes in species assemblages were observed during extreme El Niño/La Niña years (1998 to 2002) off northern Washington State to central Oregon. The pelagic community shifted from one dominated by southern species (mackerels and hake) to one dominated by northern species (squid, smelts, and salmon), with the small pelagic species (sardines, herring, and anchovy) showing no consistent trends in abundance over this time (Brodeur et al. 2005).

Coastal Pelagic Species

The coastal pelagic species in the project area include four commercially valuable finfish species (Pacific sardine, *Sardinops sagax*; Pacific [chub] mackerel, *Scomber japonicus*; northern anchovy, *Engraulis mordax mordax*; and jack mackerel, *Trachurus symmetricus*) and market squid (*Loligo opalescens*) (NOAA 1993; Pacific Fishery Management Council 2003a) (Table 3-1). The distribution of coastal pelagic species typically depends on water temperature, but can vary both annually and seasonally (Pacific Fishery Management Council 2005). For many of these species, occupancy zones may vary by life-history stage.

Table 3-1. Associations and times of occurrence for common pelagic and benthic species potentially present in the project area.

Fish	Typical Habitat	Time of Occurrence
Coastal Pelagic Species		
Sardine/anchovy/herring	Pelagic (open water) schooling fish	Year-round
Mackerel	Pelagic, schooling fish	Spring-summer
Squid	Pelagic, shelf zone	Spring-summer
Salmon		
Pacific salmon and steelhead	Pelagic, nearshore, upwelling areas	Year-round
Sea-run bull and cutthroat trout	Pelagic, nearshore, upwelling areas	Fall through winter (returning adults); spring (juvenile outmigrants)
Highly Migratory Species		
Tuna	Pelagic, shelf and slope	Year-round
Shark	Pelagic, nearshore, upwelling areas	Year-round
Groundfish		
Rockfish	Demersal (on or near the bottom), nearshore, shelf, and slope rocky areas	Year-round
Thornyhead	Demersal, shelf or slope, soft-bottom areas	Year-round
Flatfish	Demersal, nearshore/shelf, and slope sandy, muddy, or gravelly bottoms	Year-round
Gadid	Pelagic/semipelagic, nearshore, and shelf in large inlets	Year-round
Shark	Pelagic, nearshore and shelf	Year-round
Skate	Demersal, shelf, mud or sand substrate	Year-round
Lingcod and cabezon	Demersal, nearshore, rocky, or steep slopes	Year-round
Sablefish	Demersal, shelf slope, sand, mud, or clay substrate	Year-round
Green sturgeon	Demersal, shelf slope, sand, mud, or clay substrate	Summer
Other Demersal Species		
Halibut	Demersal, shelf, sand, and gravel substrate	Year-round
Crustaceans: mysids, euphausiids, amphipods	Nearshore, sand/mud substrate	Year-round
Crab	Nearshore, sand/mud substrate	Year-round

The PFMC and NMFS identified essential fish habitat for coastal pelagic species based on the temperature range where the fish occur and on the geographic area where they are present at any particular life stage. This range varies widely according to ocean temperature. Identifying essential fish habitat for coastal pelagic species is also based on where these species have been observed in the past and where they may occur in the future.

The east-west boundary of essential fish habitat for coastal pelagic species includes all marine and estuary waters from the coasts of California, Oregon, and Washington to the limits of the EEZ and above the thermocline (Pacific Fishery Management Council 2006). Surface temperatures above the thermocline exhibit considerable variability, ranging from 50° to 79° F (10° to 26° C). The northern essential fish habitat boundary is defined as the position of the 50° F isotherm, which varies seasonally and annually. The 50° F (10° C) isotherm is a rough estimate of the lowest temperature where coastal pelagic finfish managed by PFMC are found; thus, it represents their northern boundary. In years with cold winter sea surface temperatures, the 50° F (10° C) isotherm during February is around 43 degrees north latitude in the offshore zone and slightly farther south along the coast. In August, this northern boundary moves up to Canada or Alaska (Pacific Fishery Management Council and NMFS 2006). Therefore, the northern extent of essential fish habitat for coastal pelagic species likely occurs south of the project area in winter. During spring and summer months, with the northward migration of the 50° F (10° C) isotherm, essential fish habitat likely occurs within the project area.

Salmonid Species

All Pacific salmonid species exhibit varying forms of anadromy (they spend their early life stages in fresh water, migrate to the ocean to grow and mature, and return to fresh water as adults to reproduce). For further information on the life history and behavioral ecology of Pacific salmonid species, see Groot and Margolis (1991) and Emmett et al. (1991). Twenty-eight population groups of West Coast salmon and steelhead (*Oncorhynchus* spp.) are currently listed as threatened (23) or endangered (5) under the ESA. Threatened bull trout populations occur in major coastal rivers of Washington (64 Fed. Reg. 58913, November 1, 1999). Although limited data exist regarding the distribution of bull trout in marine waters, they are known to migrate between these rivers and are expected to occur occasionally in the project area (USFWS 2004). Although some of the ESA-listed salmonids noted above might occur in the project area, there is no designated critical habitat for these salmonids within the project area, except for the freshwater habitat areas used by threatened Ozette Lake sockeye salmon. The depressed production of many West Coast salmonid stocks, particularly the ESA-listed stocks, is due to a combination of factors, including freshwater habitat degradation and unfavorable ocean conditions during the 1990s. The population sizes of some of these salmonid species have increased in recent years, presumably in part because of improved ocean survival conditions (Ford 2011; Pacific Fishery Management Council 2003b). As noted above, run sizes of salmonid stocks over decadal time scales appear to be strongly affected by the Pacific Decadal Oscillation ocean climate cycle (Subsection 3.3.3.1.1, Physical Features and Processes, Dynamic Processes and Variability, Pacific Decadal Oscillation). Salmonid species are also influenced by El Niño events, with the effect depending on the preferred water depth of the given species. Salmon that prefer more shallow habitats, such as coho salmon, are more likely to be affected by El Niño than other salmon species, such as Chinook salmon (Pacific Fishery Management Council 2003b).

The PFMC and NMFS identified essential fish habitat for salmon in estuaries and marine areas extending from the shoreline to the 200-mile (322 km) limit of the EEZ and beyond. In fresh water, salmon essential fish habitat includes all lakes, streams, ponds, rivers, wetlands, and other bodies of water that have been historically accessible to salmon (Pacific Fishery Management Council and NMFS 2006). The PFMC may use gear restrictions, time and area closures, and harvest limits to reduce negative impacts on salmon essential fish habitat. Salmon essential fish habitat occurs throughout the year in the project area.

Highly Migratory Species

Highly migratory species include tuna, billfish, and sharks. These species exhibit a wide-ranging distribution throughout the Pacific Ocean and are not typically associated with specific substrata or benthic habitats (e.g., kelp forests or rocky substrata). Rather, their distribution often reflects large-scale oceanographic features with preferred levels of physical characteristics (for example, temperature, salinity, and oxygen), or concentrations of preferred prey (Pacific Fishery Management Council 2003a).

For a general description of gray whale feeding on pelagic prey, see Subsection 3.4.3.1.3, Feeding Ecology and Role in the Marine Ecosystem. For a description of variable and dynamic gray whale habitat use and distribution in the project area related to pelagic prey distribution and climatic and ocean condition variability, see Subsection 3.4.3.3.1, ENP Seasonal Distribution, Migration, and Movements.

3.3.3.2 Benthic Environment

3.3.3.2.1 Physical Features and Processes

Substrata

Nearshore Habitats

As with the pelagic environment, nearshore benthic habitats are dynamic environments subject to energetic disturbances from climatic, oceanographic, and terrestrial processes. Nearshore habitat characteristics and species composition are strongly influenced by the dominant forms of marine algae, tidal range, depth, and type of substrate (Proctor et al. 1980). The nearshore habitats in the project area are composed of rocky shores, sandy beaches, and gravel beaches (Department of the Navy 2006). These habitats can be divided into several vertical zones: the splash zone, the upper intertidal zone (submerged for a short time and exposed to the widest range of temperatures), the mid-littoral zone (alternately submerged and exposed for moderate periods of time), the swash zone (submerged for approximately 12 hours per day), the low intertidal zone (exposed for brief periods of time during the lowest tides), and the subtidal zone (substrata below the lowest tides that are always submerged). These vertical zones reflect the intensity of the physical forces affecting nearshore habitats and structure the ecosystems that inhabit them.

Coastal Benthos

The continental shelf off the project area varies from 15 to 40 miles (24 to 64 km) wide, including habitats of hard and soft substrata. The most common seafloor habitat, particularly north of La Push, consists of mixed hard and soft substrates (e.g., coarse sand, gravel); hard-bottom habitats are the least common component of seafloor substrate (N. Wright, OCNMS, pers. comm., June 12, 2012). The Department of the Navy (2006) estimated that, beyond the depths of kelp beds (more than 100 feet/30 m), approximately 3 percent of the sea floor consists of hard-bottom substrata. Hard-bottom habitats may be composed of bedrock, boulders, cobble, or gravel.

The Columbia River is a major source of sediment for soft-bottom habitats along the Pacific coastline. The sediment is initially deposited near the mouth of the Columbia River. As winter storms pass through the Pacific Northwest, much of this sediment is transported northward along the coast, resulting in a 30-foot-thick (9-meter-thick) deposit of silt overlying the Washington continental shelf (Hickey and Banas 2003). Offshore soft-bottom habitats are composed primarily of silt and mud with sandy areas occurring closer to the coastline.

Submarine Canyons

The otherwise smooth bathymetry along the project area is broken by two submarine canyons, the Juan de Fuca and Quinault canyons, running perpendicular to the shore (Strickland and Chasan 1989). These habitats are dynamic, highly productive, and complex ecosystems. Submarine canyons facilitate locally increased upwelling, high nutrient availability, and vigorous productivity (Freeland and Denman 1982; Hickey 1995). Submarine canyons are also sites of accumulation for organic debris from drift macroalgae, surfgrass, and plankton detritus produced in surface waters. The complex habitat structure of submarine canyons (such as vertical cliffs, ledges, talus, cobble and boulder fields, and soft sediments) also provides cover for numerous fish and invertebrate species.

Dynamic Processes and Variability

Nearshore community structure and species composition in rocky tidal and beach habitats are principally determined by the frequency and magnitude of physical disturbances (Sebens 1987), intense intra- and inter-specific competition and predation (Connell 1978; Paine 1969; Robles and Desharnias 2002), and highly variable recruitment dynamics (Gaines and Roughgarden 1985; Menge and Sutherland 1987; Roughgarden et al. 1988). These nearshore habitats and the organisms that inhabit them are subjected to nearly constant and intense physical agitation and disturbance (Proctor et al. 1980; Airamé et al. 2003) from wind, waves, tides, temperature, desiccation, sediments, and sand scouring. Despite some protection from offshore islands, submarine ridges, projecting headlands, and large offshore kelp beds, the coast of the project area is subject to strong wave action even in calm weather.

Soft substrata habitats of the coastal benthos are structured by depth gradients in temperature, disturbance by storms and wave action, and movement and accumulation of sediments (Maragos 2000). Submarine canyons that indent the Washington coastal shelf, such as the Juan de Fuca and Quinault canyons in the project area, facilitate locally increased upwelling and nutrient availability in nearshore areas (Freeland and Denman 1982; Hickey 1995). Turbidity currents associated with submarine canyons represent episodic disturbances that serve as major conduits for sediment transport to the deep sea. These turbidity currents erode canyon walls, transport loose sediments and detrital material, and significantly structure infaunal communities associated with submarine canyons (Vetter and Dayton 1998; Vetter and Dayton 1999).

3.3.3.2.2 Biological Resources

Marine Algae, Marine Plants, and Associated Biota

Surfgrass (*Phyllospadix* spp., and associated macroalgae) and kelp (bull kelp *Nereocystis* sp., giant kelp *Macrocystis* sp., and other brown algae) communities are associated with rocky nearshore habitats. Surfgrass (*Phyllospadix* spp.) is an aquatic plant species present in rocky subtidal and intertidal habitats with high wave exposure. Surfgrass occurs from the intertidal zone to 23 feet (7 m) deep (Ramírez-García et al. 2002), exhibits very high rates of production (Proctor et al. 1980), and hosts a diverse community of invertebrates and fishes. Kelp communities are found 6 to 200 feet (2 to 61 m) deep (Rodriguez et al. 2001) and can persist in areas subject to severe wave action and tidal currents. The overlying canopies, understory, turf, and coralline algae layers of kelp forests provide essential refuge, forage, and nursery habitats for associated algal, invertebrate, and fish communities (Proctor et al. 1980; Rodriguez et al. 2001). Kelp forests also provide an important food resource for inhabitants of soft and rocky benthic habitats, submarine canyons, deep channel basins, sandy and gravel beaches, rocky shores, and coastal lagoons (Airamé et al. 2003). Several marine mammal species, including sea otters and gray whales, forage and find refuge from predators in kelp forests (Cummings and Thompson 1971; Deysher et al. 2002; Nerini 1984). Kelp forests exhibit extremely high rates of primary production, growing up to 4 inches (10.2 cm) per day. Temperature, light, sedimentation, substrate, relief, wave exposure, nutrients, salinity, and biological factors (i.e., grazing, competition with other species) determine the distribution and abundance of kelp (Graham 1997). The highest densities are found on moderately low relief rocky substrata with moderate to low sand coverage (Deysher et al. 2002), while areas with very low relief and abundant sand are less favorable to persistent stands of kelp (Foster and Schiel 1985; Graham 1997). In addition to the primary habitat that kelp forests provide, they also provide secondary habitat for juvenile fishes, invertebrates, and seabirds in the form of drifting rafts of detached kelp.

Infaunal, Benthic, and Epibenthic Organisms

Rocky benthic subtidal habitats support extensive communities of benthic marine algae and invertebrates, as well as demersal invertebrates (e.g., mysids and cumaceans) living in close association with the sea floor (refer to Marine Algae, Marine Plants, and Associated Biota above). Sessile benthic invertebrates in these habitats are subject to less severe physical agitation and disturbance than in rocky intertidal habitats. As with intertidal communities, however, intense intra- and inter-specific competition and predation, along with highly variable recruitment dynamics, are principal forces in structuring the abundance, composition, and variability of these communities.

Soft-bottom subtidal habitats also support a rich diversity of infaunal invertebrates, including amphipod crustaceans, echinoderms, and polychaete worms, as well as highly motile epibenthic invertebrate species (such as Dungeness crab). Benthic infauna are organisms that live in the sediments by attaching to the soft substratum, dwelling in tubes, or burrowing through the sediments. Infaunal communities are often used as baselines for ecological assessments because they tend to exhibit more stable species composition and population dynamics than more mobile epifaunal assemblages such as crabs or bottom fish. This apparent stability is, however, subjected to considerable physical disturbance and variability and should not be interpreted to reflect a static environment. Soft-bottom benthic habitats along the Washington coast, including the project area, are productive biological environments influenced by a variety of complex physical processes (Braun 2005). The major short-term processes that affect infaunal communities include predation (e.g., by gray whales; Feyrer 2010), as well as tidal-, wind-, and wave-induced turbulence; currents; sedimentation from the Columbia River plume and local rivers; storms; and variability in food availability associated with upwelling and plankton blooms (Braun 2005). The infauna that inhabit this environment are adapted to these high-energy environments with high sediment deposition, erosion, and sediment transport. Large storms with large waves, large freshwater outputs from the Columbia River and other rivers, and semi-diurnal tides act to suspend sediments and organic particulates. The organisms that inhabit these constantly shifting substrata tend to be highly motile rapid burrowers, rapid tube builders, or rapid colonizers with regular recruitment. Seasonal and interannual variability in the species composition and abundance of infaunal communities off the Washington coast is considerable, particularly at inshore locations influenced by sediment movement resulting from winter storms and river outfalls (Richardson et al. 1977). In summary, benthic soft-bottom habitats are subject to frequent high-intensity disturbances and are inhabited by infaunal communities of opportunistic colonizers exhibiting strong seasonal variability and spatial patchiness (Richardson et al. 1977; Oliver et al. 1980; Hancock 1997).

For a general description of gray whale feeding on benthic prey, refer to Subsection 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem. For a description of gray whale benthic feeding in the northern portion of the summer range, refer to Subsection 3.4.3.3.1, Summer Range Distribution and Habitat Use, Northern Portion of the Summer Range. For a description of gray whale benthic feeding occurring in the project area, refer to Subsection 3.4.3.3.1, ENP Seasonal Distribution, Migration and Movements.

Groundfish

Benthic habitats along the continental shelf support a large biomass of demersal (bottom-dwelling) groundfishes (Dark and Wilkins 1994). Adult groundfish species (e.g., rockfish, *Sebastes spp*.; sablefish, *Anoplopoma fimbria*; Pacific hake/whiting, *Merluccius productus;* spotted ratfish, *Hydrolagus colliei*; and spiny dogfish, *Squalus acanthius*) typically are associated with hard substrata of offshore reefs, banks, and submarine canyons. As with pelagic species, physical oceanographic processes such as currents, upwelling, the Columbia River plume, fronts, and eddy features influence the distribution and abundance of groundfish species (Doyle 1992; Dower and Perry 2001; Nasby-Lucas et al. 2002; Williams and Ralston 2002; Bosley et al. 2004; Emmett et al. 2004; Emmett et al. 2006). The groundfish community in the Pacific Northwest also exhibits a strong depth gradient in species composition and diversity (Tolimieri and Levin 2006). Many groundfish species produce pelagic larval and juvenile life stages, which generally float or swim near the sea surface and may be associated with floating debris such as kelp rafts. Pelagic larval and juvenile life stages are widely dispersed by storms, upwelling and ocean currents, and have limited associations with specific nearshore or benthic habitats (NOAA 1993). Older life stages, however, exhibit stronger habitat associations based on specific zones, depths, or substrate characteristics. Other groundfish species may exhibit seasonal migrations, resulting in an annual variation in habitat preferences (NMFS 2005c). The distribution, abundance, and recruitment of groundfish species is also strongly affected by climatic/oceanographic variability such as El Niño events. During periods of El Niño, there is an overall northward shift of tropical and temperate species (Cross 1987; Cross and Allen 1993). Rockfish are particularly sensitive to El Niño, demonstrating a decline in overall biomass as a result of recruitment failure and reduced growth of adults as poor ocean conditions in the region become evident (Lenarz et al. 1995; Moser et al. 2000).

With respect to conservation status, seven West Coast groundfish species occurring in the project area are designated as overfished under the Magnuson-Stevens Act (PFMC 2011) (an overfished species is defined as a population below 25 percent of its natural [unfished] population size). These species are darkblotched rockfish (*Sebastes crameri*), bocaccio (*S. paucispinis*), cowcod (*S. levis*), canary rockfish (*S. pinniger*), yelloweye rockfish (*S. ruberrimus*), Petrale sole (*Eopsetta jordani*), and Pacific Ocean perch (*S. alutus*) (PFMC 2011). The PFMC and NMFS have established the Yelloweye Rockfish Conservation Area in the project area to limit the incidental catch of this overfished species. The following groundfish species are designated as emphasis species (species in need of ongoing conservation efforts and noted for their importance to commercial and recreational fisheries): sablefish, Dover sole (*Microstomus pacificus*), English sole (*Paraphrys vetulus*), Petrale sole, arrowtooth flounder (*Atheresthes stomias*), chilipepper rockfish (*S. goodei*), yellowtail rockfish (*S. flavidus*), black rockfish (*S. melanops*), longspine thornyhead (*Sebastolobus altivelis*), shortspine thornyhead (*S. alascanus*), and cabezon (*Scorpaenichthys marmoratus*) (PFMC 2011).

Two non-salmonid, ESA-listed species of fish occur in the project area—green sturgeon and eulachon. The Southern distinct population segment of North American green sturgeon

(*Acipenser medirostris*), which spawns in the Sacramento River (California), was listed as threatened on April 7, 2006 (71 Fed. Reg. 17757). Its critical habitat includes the entire project area out to a depth of 60 fathoms (74 Fed. Reg. 52300, Oct. 9, 2009). The Southern distinct population segment of Pacific eulachon was listed on March 18, 2010 (75 Fed. Reg. 13012) and also occurs in the project area. None of its critical habitat occurs within the project area.

Essential fish habitat has been designated by the Pacific Fishery Management Council and NMFS for groundfish in the project area. A comprehensive description of essential fish habitat off the coast of Washington is available in the Final Groundfish Essential Fish Habitat EIS (NMFS 2005c). In addition to designating essential fish habitat for groundfish, NMFS also recently identified habitat areas of particular concern. Habitat areas of particular concern include seagrass, canopy kelp, rocky reef, and estuaries along the Pacific coast, including the project area (NOAA 2006).

3.4 Gray Whales

3.4.1 Introduction

The Makah Tribe included in its request "certain management measures . . . designed to minimize impacts to those whales that exhibit inter-annual site fidelity to the Pacific coast south of Alaska." While a Makah whale hunt (as proposed by the Tribe) would target migrating ENP gray whales, it might also kill gray whales from the Pacific Coast Feeding Group (PCFG), and there is a chance that Western North Pacific (WNP) gray whales might be killed, subjected to harpoon attempts, or approached. More detailed information about ENP, WNP, and PCFG whales is contained in subsections of Subsection 3.4.3, Existing Conditions. The status, population structure, distribution, and habitat use of the gray whale are relevant when analyzing the effects of any hunt on the population and on whales that migrate through or stop to feed in the waters off the Washington coast. It is also important to establish information to analyze and understand how an individual gray whale may be affected by a hunt.

3.4.2 Regulatory Overview

The regulatory information presented for the MMPA and Whaling Convention Act (WCA) in Subsection 1.2, Legal Framework, including the Treaty of Neah Bay and the Makah Tribe's whaling rights, describes the legal processes relevant to our evaluation of the tribe's proposal to resume hunting gray whales. The information in the current subsection focuses on the statutory and regulatory conservation standards that inform our management of cetaceans in general, including gray whales.

> **GRAY WHALE DEFINITIONS**
>
> **Western North Pacific (WNP) gray whales:** Gray whales that feed during the summer and fall in the Okhotsk Sea (primarily off northeast Sakhalin Island, Russia), some of which also feed off southeastern Kamchatka in the Bering Sea.
>
> **Eastern North Pacific (ENP) gray whales:** Gray whales that feed during the summer and fall primarily in the Chukchi, Beaufort, and northwestern Bering Seas, but also as far south as California.
>
> **PCFG whales:** Gray whales observed in at least 2 years between June 1 and November 30 in the PCFG area (along the U.S. and Canada coasts between 41°N and 52°N, excluding areas in Puget Sound) and entered into the Cascadia Research Collective's photo-identification catalog. For purposes of determining whether a harvested whale is a PCFG whale (i.e., counts against a bycatch or mortality limit) the Tribe's proposal under Alternative 2 would include cataloged whales seen in at least 1 year, while the other action alternatives would include cataloged whales seen in 2 or more years or at least once in the past 4 years.
>
> **OR-SVI whales:** PCFG whales observed in any survey area from southern Oregon to southern Vancouver Island (excluding areas in Puget Sound).
>
> **Makah U&A whales:** PCFG whales observed in either the northern Washington survey area (from Cape Alava to Cape Flattery) or Strait of Juan de Fuca survey area (from Cape Flattery to Admiralty Inlet).

3.4.2.1 Marine Mammal Protection Act Management

NMFS has jurisdiction over cetaceans and most other marine mammals under the MMPA, the primary federal law governing marine mammal conservation and protection in the United States (Subsection 1.2.3, Marine Mammal Protection Act) (the USFWS has jurisdiction over some marine mammals). Therefore, the discussion below describes basic principles of marine mammal management under the MMPA which are relevant to the Tribe's request. The take moratorium, waiver, regulations, and permits are discussed in Subsection 1.2.3.2, Section 101(a) – Take Moratorium and therefore are not addressed here. The requirements of the MMPA help inform the evaluation criteria we use to analyze and compare the alternatives; however, it is not the purpose of this EIS to resolve legal issues.

3.4.2.1.1 <u>Defining Marine Mammal Population Parameters</u>

Optimum Sustainable Population — OSP

The MMPA declares that marine mammals should be maintained as "a significant functioning element of the ecosystem of which they are a part" and that "consistent with this major objective, they should not be permitted to diminish below their optimum sustainable population (OSP)" (16 USC 1361(6)). OSP is defined statutorily as "the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem in which they form a constituent element" (16 USC 1362(9)). We have further defined OSP in agency implementing regulations as "a population size which falls within a range from the population level of a given species or stock which is the largest supportable within the ecosystem [known in biological terms as carrying capacity, abbreviated as K] to the population level that results in maximum net productivity level [MNPL]" (50 CFR 216.3). We manage impacts to marine mammal populations according to congressional directives with the goal of maintaining the number of animals within OSP between K and MNPL, or, if a population is below OSP, achieving that level. To understand the operating theory of OSP, it is important to understand the biological implications of K and MNPL, the endpoints of the OSP range.

Carrying Capacity — K

K (the upper limit of OSP) is the population level that can be supported in the ecosystem as determined by the natural elements, such as food, predation, temperature, ice cover, etc. As population density increases, birth rates often decrease and death rates typically increase. K is the point at which birth rates and death rates are equal. It is, thus, the number of individuals an environment can support and is the largest size of a density-dependent population at which the population maintains equilibrium (population size neither increases nor decreases). For a particular environment, K will vary by species and can change over time because of a variety of factors, including food availability, disease, competition, predation, environmental conditions, and space. It is possible for a species to exceed its K temporarily.

Maximum Net Productivity Level — MNPL

MNPL (the lower limit of OSP) is a population level related to maximum net productivity, a rate of change defined in NMFS regulations as "the greatest net annual increment in population numbers or biomass resulting from additions to the population due to reproduction and/or growth less losses due to natural mortality" (50 CFR 216.3). In practical terms, MNPL is the population level (i.e., number of animals) that will yield the maximum recruitment into a marine mammal population (i.e., births minus deaths). Sometimes MNPL is expressed as a fraction of K.

3.4.2.1.2 Calculating Marine Mammal Population Parameters

As implemented by NMFS, K is not the historic, but the current carrying capacity of the habitat, without human influence (Gerodette and DeMaster 1990; NMFS 1992a; Carretta et al. 2014). As described in Gerodette and DeMaster (1990):

> "As normally used in applied population dynamics, carrying capacity refers to an equilibrium population level under conditions of no harvest. Human activities which lead

> to habitat degradation or loss may reduce the carrying capacity. The intent of the MMPA, however, clearly was not to condone alteration of marine mammal habitat; a reduction in carrying capacity due to habitat degradation may lead to a marine mammal stock being classified as depleted. Consequently, in the context of OSP determination and as used in this paper, carrying capacity refers to an equilibrium population level before impact by man, either direct (through harvest or incidental killing) or indirect (through habitat degradation or harvest of predator, prey, or competitor species)."

Gerodette and DeMaster (1990) describe various methods of estimating K. For a population that was hunted or subjected to fisheries bycatch, one method is to start with the present size of the population and back-calculate, using the numbers of animals that were killed by hunting or killed as bycatch. Various researchers used this method to estimate the K value for dolphin populations being incidentally killed in tuna fisheries, and for ENP gray whales and bowhead whales (Gerodette and DeMaster 1990). The challenge of this method is that it requires reliable information about several different factors, including present population size and numbers of removals.

Another method described by Gerodette and DeMaster (1990) is to estimate K based on some environmental limiting factor, such as food supply or haulout sites (e.g., the work by Laidre et al. [2002] to estimate carrying capacity of sea otters in Washington State). Another method is to infer K based on an estimate of MNPL. In a logistic model of population growth, MNPL (the lower limit of OSP) is 50 percent of K, but it is generally accepted that because marine mammals are long-lived with slow rates of reproduction, they have MNPL closer to K (Eberhardt and Siniff 1977). In the absence of direct measurements of MNPL, we have chosen the model-derived value of 60 percent of K as the MNPL (45 Fed. Reg. 72178, October 31, 1980). Some researchers have been able to assess OSP for some species using estimates of abundance over time as the population has recovered from exploitation to an equilibrium level. By fitting logistic growth models to the abundance estimates, the researchers have been able to determine the point at which productivity peaked and population growth slowed, indicating the population had passed its MNPL (the lower bound of OSP) (Wade and Perryman 2002; Jeffries et al. 2003; Brown et al. 2005; Punt and Wade 2012).

3.4.2.1.3 Linking Marine Mammal Population Parameters to Removals

A goal of the MMPA is to prevent stocks from diminishing below their OSP (that is, below MNPL). The difficulty of determining whether a stock is at OSP, and how human-caused mortality might affect population abundance relative to OSP, makes it difficult to manage toward this goal. Because much of NMFS' efforts involved managing sources of human-caused incidental mortality, the agency accordingly explored other options specifically focused on human-caused incidental mortality. This focus led the agency to develop a management tool referred to as the potential biological removal (PBR) approach that would allow it to determine whether particular mortality levels would maintain a given stock at OSP, or allow it to reach OSP if it was below that level. In 1992, NMFS submitted a legislative proposal to Congress outlining the PBR approach for determining how many individuals could be removed from a population stock of marine mammals while allowing the stock to recover to, or be maintained within, its OSP (NMFS 1992a).[2]

3.4.2.1.4 Defining and Calculating PBR

Congress amended the MMPA in 1994 to incorporate a regime to govern the taking of marine mammals incidental to commercial fishing operations (section 118); many aspects of the new provision were based on the legislative proposal we submitted to Congress in 1992 (NMFS 1992a). The concept of PBR was among the aspects of our proposal included in the 1994 MMPA amendments. Under 16 USC 1362(20), PBR level is defined as the "maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population."

The MMPA (16 USC 1362(20)) also prescribes a formula for calculating PBR, which is the product of three factors:

$PBR = N_{min} * 0.5R_{max} * F_r$

- N_{min} is the minimum population estimate of the stock.
- $0.5R_{max}$ is one-half the maximum theoretical or estimated net productivity rate of the stock at a small population size.
- F_r is a recovery factor of between 0.1 and 1.0.

[2] NMFS and the IWC use different methods for calculating allowable removals from marine mammal populations. NMFS operates under the purposes and policies of the MMPA by applying the PBR approach for certain types of take, which focuses on maintaining marine mammal populations at OSP. The IWC operates under the ICRW, which historically had a harvest focus. The IWC calculates allowable removals or catch limits by focusing on sustainable yield under the maximum sustainable yield model (refer to Subsection 1.2.4.1.3, IWC Aboriginal Subsistence Whaling). The IWC's Scientific Committee advises the IWC on a minimum stock level for each stock, below which whales are not taken, and on a rate of increase towards the maximum sustainable yield level for each stock (footnote to IWC Schedule, Paragraph 13(a)(2)). The ENP gray whale stock is at or above maximum sustainable yield level, so aboriginal subsistence catches are allowed as long as they do not exceed 90 percent of that maximum sustained yield (Paragraph 13(a)(1)).

As long as the total number of animals removed from the population as a result of human sources is no more than the calculated PBR of an affected stock of marine mammals, then the removals will not prevent the stock from recovering to, or being maintained within, its OSP.

3.4.2.1.5 Implementing the PBR Approach

Before implementing the PBR approach, we selected default values for the parameters of the PBR formula that would meet specific performance criteria and ran simulations to test whether human-caused mortality below the PBR level would maintain OSP or allow recovery to OSP (Barlow et al. 1995). In these performance trials, numerous individuals from a hypothetical marine mammal stock were removed from the population at levels up to the calculated PBR each year. One of the following two conditions was satisfied for at least 95 percent of simulation trials: 1) populations at MNPL (i.e., the low end of the OSP range) would remain at that level or above it after 20 years, and 2) populations below OSP (i.e., depleted populations at 30 percent of K) would recover to OSP within 100 years. In their conclusions, Barlow et al. (1995) noted that the PBR approach, as recommended and tested, would satisfy the objectives of the MMPA and would facilitate the section 2 mandate to develop marine mammal stocks to the greatest extent feasible. In other words, for marine mammal stocks at OSP, human-caused mortality at or below the PBR level would not cause them to fall below OSP, and for marine mammal stocks below OSP, human-caused mortality at or below the PBR level would not prevent them from achieving OSP. Wade (1998) reported on more extensive trials simulating the PBR approach and confirmed the major conclusions related to the performance of PBR from Barlow et al. (1995).

Wade and Angliss (1997) describe the results of a NMFS-convened workshop to review the initial PBR guidelines. Workshop participants concluded that the initial guidelines were adequate in most areas and recommended some minor revisions to the use of abundance estimates in calculating PBR. The most notable recommendation was that PBR levels should be reported as unknown when the supporting abundance estimate for the affected marine mammal stock is at least 8 years old, unless there is compelling evidence that the stock has not declined since the last abundance estimate.

3.4.2.1.6 Stock Assessment Reports

Section 117 of the MMPA (16 U.S.C. 1386) requires preparation of a stock assessment report for each recognized marine mammal stock occurring within U.S. jurisdiction. The report must describe the geographic range of the stock; provide a minimum population estimate (Nmin), current and maximum (MNPL) net productivity rates, and current population trend; report human-caused mortality and serious injury by source; describe commercial fisheries that interact with the stock; categorize the status of the stock according to whether human-caused mortality and serious injury are likely to cause it to be below OSP; and estimate PBR for the stock. The reports are reviewed by the regional scientific review groups and made available for review and comment by the Marine Mammal Commission and the public before they are finalized. The most recent stock assessment report for gray whales is Carretta et al. (2014).

As noted above, in 2005 we adopted new Guidelines for Preparing Stock Assessment Reports pursuant to section 117 of the MMPA and produced a report "Revisions to Guidelines for Assessing Marine Mammal Stocks" (commonly known as GAMMS) (NMML 2005). A workshop of NMFS scientists convened in 2011 recommended revisions to the 2005 GAMMS (Moore and Merrick 2011). The proposed revisions were made available for public comment via a Federal Register notice on January 24, 2012 (77 Fed. Reg. 3450) and in which NMFS emphasized a number of specific issues discussed at the workshop, including:

- Improving stock identification – proposals included 1) specifying whether it is plausible that a stock may actually comprise multiple stocks, and 2) identifying where human-caused mortality or serious injury is concentrated within the range of such a stock.
- Apportioning PBR across feeding aggregations, allocating mortality for mixed stocks, and estimating PBR for transboundary stocks – proposals included 1) ways to apportion and report on mortality or serious injuries, and 2) clarifying when and how to estimate PBR over broad areas with disparate survey data.

Workshop participants also recommended that the criterion for determining when a group of animals should be considered a separate population stock is when it is demographically independent, rather than demographically isolated. The workshop report states:

> "The group agreed to replace references to 'reproductive isolation' and 'demographic isolation' in the Report guidelines with references to 'demographic independence,' as the term 'isolation' is likely to be interpreted by some as implying that there should be no interchange between stocks."

NMFS is currently reviewing public comments on the proposed revisions. Once adopted, the new guidelines would replace those issued in 2005.

3.4.2.2 Whaling Convention Act

3.4.2.2.1 Whaling License

Under the WCA (16 USC 916d) and NMFS regulations (50 CFR 230.3(b)), no person may engage in whaling without a license. We have by regulation issued a license "to whaling captains identified by the relevant Native American whaling organization" (50 CFR 230.5(a)). We may suspend the license of any captain who fails to comply with NMFS' regulations. Our regulations further specify that any aboriginal subsistence whaling quota shall be allocated to each whaling village or captain by the appropriate Native American whaling organization. At least annually, we are to publish aboriginal subsistence whaling quotas and any restrictions on subsistence whaling in the Federal Register. When we published the first aboriginal subsistence whaling quotas for the use of the Makah Tribe, we also explained the background of the request to the IWC and the relevance of the IWC authorization (see, for example, 63 Fed. Reg. 16701, April 6, 1998).

3.4.2.2.2 Equipment, Crew, Supplies, and Training

WCA section 916d(d) requires an applicant for a whaling license to furnish evidence or an affidavit that the whaling vessel is adequately equipped and competently manned to engage in whaling in accordance with the provisions of the ICRW, the regulations of the IWC, and NMFS' regulations. NMFS' regulations regarding aboriginal subsistence whaling prohibit whaling without adequate crew, supplies, or equipment (50 CFR 230.4(d)). In the past, when we published aboriginal subsistence whaling quotas for the use of the Makah Tribe, we executed agreements with the Makah Tribal Council that specified the details regarding the supplies, equipment, crew, and training.

3.4.2.2.3 Wasteful Manner Restrictions

WCA regulations prohibit whaling captains from engaging in whaling in a wasteful manner (50 CFR 230.4(k)). Wasteful manner means "a method of whaling that is not likely to result in the landing of a struck whale or that does not include all reasonable efforts to retrieve the whale" (50 CFR 230.2). Related to reasonable efforts to retrieve any whale, WCA regulations also require whaling captains to use harpoons, lances, or explosive darts that bear a permanent distinctive mark identifying the whaling captain (50 CFR 230.4(j)). The mark allows struck and lost whales that wash ashore, or are found later, to be identified and reported as struck and lost whales. WCA regulations also prohibit whaling for any calf or parent accompanied by a calf (50 CFR 230.4(c)).

3.4.2.2.4 Recording and Reporting

WCA regulations require the Native American whaling organization to monitor the hunt, keep a tally of the number of whales struck and landed, and close the season when the quota is reached (50 CFR 230.7(b)). Whaling captains must provide oral or written reports on whaling activities to the Native American whaling organization, including, but not limited to, striking, attempted striking, or landing of a whale, and (where possible) specimens from a landed whale (50 CFR 230.8(b)). The report is to include information on the number, dates, and locations of each strike, attempted strike, or landing; the length and sex of the whale landed; and an explanation of the circumstances involving any whale struck and not landed. We are also authorized to provide technical assistance to facilitate prompt reporting and collection of specimens from landed whales, including, but not limited to, ovaries, ear plugs, and baleen plates (50 CFR 230.8(b)). Following the 1999 and 2000 hunts, the NMFS observers to the hunt provided their own reports to NMFS (Gosho 1999; Gearin and Gosho 2000). The Makah Tribe and NMFS also published a joint report for the 1999 hunt (NMFS and Makah Tribal Council 2000).

3.4.3 Existing Conditions

3.4.3.1 General Life History and Biology

3.4.3.1.1 Identifying Physical Characteristics

Adult gray whales are 36 to 50 feet (11 to 15 m) long and weigh between 16 and 45 tons; females are larger than males. They have two to five deep longitudinal creases on their throats, and their heads appear narrowly triangular when viewed from above; there is no head ridge (Leatherwood et al. 1982). Gray whales have a dorsal hump followed by a series of bumps or "knuckles" along the back. Body coloration varies from light to dark gray and is typically mottled and covered with barnacles, scrape marks, and whale lice (Calambokidis et al. 1994). Scientists are able to identify individual whales using the shape of the dorsal hump, knuckle patterns, and body scars and coloration (Darling 1984; Calambokidis et al. 2004a). Gray whales have two blowholes that are side-by-side on top of their heads and can produce a large and distinctive V-shaped blow when they exhale. Migrating gray whales surface to breathe at regular intervals, generally blowing three to five times at intervals of 30 to 50 seconds, then lifting their flukes and submerging for 3 to 5 minutes (Leatherwood et al. 1982). Gray whales usually make shallow dives of 13 to 400 feet (4 to 120 m) to feed (Jones and Swartz 2009).

3.4.3.1.2 Global Distribution and Population Structure

Historically, gray whales occurred in both the North Pacific and North Atlantic Oceans (Fraser 1970; Mead and Mitchell 1984), but are currently found only in the North Pacific Ocean (Rice et al. 1984). At one time, the whales may have accessed both the Pacific and Atlantic Oceans by swimming through migratory corridors in the Arctic (Gilmore 1978), but the distribution of the species probably changed because of periodic closures of the Bering Sea during ice ages (Swartz et al. 2006). Glaciation dropped sea levels and exposed underlying continental shelf regions, including the Bering Isthmus, which effectively blocked access to the Arctic (Berta and Sumich 1999). Gray whales disappeared in the North Atlantic by the end of the seventeenth century (Mead and Mitchell 1984). However, two anomalous sightings have occurred—one in the Mediterranean Sea in 2010 and one in the South Atlantic in 2013, suggesting that the present reduction in Arctic ice may someday allow gray whales to re-colonize the North Atlantic (Scheinin et al. 2011; Elwen and Gridley 2013).

U.S. and international management authorities, including NMFS and the IWC, have identified two populations for this species: an ENP and a WNP population (IWC 2013a; Carretta et al. 2014).[3] These populations are also recognized as separate subpopulations by the International Union for Conservation of Nature (IUCN) (Reilly et al. 2008). Recent genetic studies using both mitochondrial and microsatellite markers[4] have found distinct differences between the two populations (LeDuc et al. 2002; Lang et al. 2010; Lang et al. 2011a; Meschersky et al. 2012). Lang et al. (2010) noted that the highly significant but low level of differentiation may reflect recent divergence of the two populations as well as some limited degree of interchange between them. Although some have speculated that recently detected mixing between the WNP and ENP populations (refer to Subsection 3.4.3.2.1, WNP Seasonal Distribution, Migration, and Movements) signifies a lack of gray whale population structure (Bickham et al. 2013), the results of the aforementioned genetic comparisons represent the best available science and clearly demonstrate that significant mitochondrial and nuclear genetic differences exist between whales sampled in the ENP and those sampled on the feeding ground off Sakhalin Island in the WNP (Lang et al. 2011a).

In addition, there is emerging evidence for possible substructure within the ENP population, specifically a PCFG that exhibits seasonal fidelity to feeding grounds off the west coast (Subsection 1.1.3, Summary of Gray Whale Status). After reviewing results from photo-identification, telemetry, and genetic studies available in 2010 (i.e., Calambokidis et al. 2010; Mate et al. 2010; Frasier et al. 2011), the IWC agreed that the hypothesis of the PCFG[5] being a demographically distinct feeding group was plausible and warranted further investigation (IWC 2011a). Recent research by Lang et al. (2011b) provided further support for recognizing the

[3] Both NMFS and the IWC also commonly refer to these populations as “stocks” (e.g., in NMFS’ Stock Assessment Reports), although the IWC’s stock definition may not be equivalent to a stock as defined under the MMPA. Also, WNP gray whales are sometimes referred to as the “Korean stock” while ENP gray whales are occasionally termed the “California stock.”

[4] Mitochondrial DNA (commonly referred to as mtDNA) is maternally inherited and provides information about historic gene flow of females only. Microsatellites are short segments of nuclear DNA inherited from both parents and reflect gene flow of both males and females.

[5] The PCFG is defined by the IWC as follows: gray whales observed between June 1 to November 30 within the region between northern California and northern Vancouver Island (from 41°N to 52°N) and photo-identified within this area during 2 or more years (IWC 2011a; IWC 2011b; IWC 2011c).

PCFG as a distinct feeding aggregation. These researchers compared genetic markers from whales in the southern feeding area (i.e., in the seasonal PCFG range) and northern feeding areas (north of the Aleutians, principally near Chukotka, Russia and Barrow, Alaska). They found that samples from whales demonstrating site fidelity to the southern feeding area (i.e., whales sighted over 2 or more years) had mtDNA patterns that were small but significantly different from whales sampled in northern feeding areas as well as samples collected off Chukotka, Russia. However, they found no significant differences between whales from the different areas when analyzing microsatellites. Lang et al. (2011b) concluded that these results indicate that 1) structure is present among gray whales using different feeding areas, 2) matrilineal fidelity plays a role in creating such structure, and 3) individuals from different feeding areas may interbreed. Although NMFS concluded that the PCFG did not currently warrant designation as a stock, these findings led the agency to state in the stock assessment report that the PCFG may warrant consideration as a distinct stock in the future. Accordingly, NMFS expanded the ENP stock assessment report to include abundance, PBR, and human-caused mortality for PCFG whales (Carretta et al. 2014). The issue of stock structure of the PCFG is discussed in more detail in Subsection 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales.

The annual migration of gray whales is a conspicuous but unexplained feature of their behavioral repertoire. Some hypotheses offered to explain migratory behavior focus on benefits to newborn calves (e.g., thermoregulation, protected “nursery areas,” etc.) and some do not (e.g., resource tracking, the evolutionary “holdover” hypothesis, etc.) (Corkeron and Connor 1999). Corkeron and Connor (1999) propose that migration to low latitude areas provides a major selective advantage for pregnant female whales in that it reduces the risk of killer whale (*Orcinus orca*) predation on their newborn calves. That is, killer whales are substantially more abundant in high latitudes and this coincides with where most attacks on gray whale calves have been observed. Seasonally predictable sources of food have broadly shaped gray whale life history into two major periods: summers, when whales feed in higher latitudes with abundant food and minimal sea ice, and winters, when whales migrate to lower latitudes to escape sea ice and inclement weather and to nurture newborn calves in warmer waters (Swartz 1986; Swartz et al. 2006). These seasonal migrations have led to a description in the scientific literature of ‘summer feeding grounds’ and winter ‘breeding (or calving) grounds.’ Gray whales feed opportunistically on a diversity of prey species throughout their entire range (Nerini 1984). Similarly, they breed in the late fall in their summer range at the onset of the southward migration, breed and calve along the migratory corridor, and breed and calve in the winter on the winter grounds (Rice and Wolman 1971). The summer range is primarily a feeding area, but also serves as a weaning and breeding area. The winter range is primarily a resting and nursing area, although some breeding also occurs. The migratory corridor supports a continuum of behaviors (feeding, breeding, and calving) as whales shift between summer and winter ranges.

Gray whale distribution and habitat use are dynamic, varying seasonally and year-to-year in response to changes in the prey base and the physical properties of the ocean environment (Subsection 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem) (Yablokov and Bogoslovskaya 1984; Darling et al. 1998; Gardner and Chávez-Rosales 2000; Dunham and Duffus 2001; Feyrer and Duffus 2011). Additionally, the species can shift its range over longer time frames in response to long-term environmental variability such as oceanic climate cycles (Pyenson and Lindberg 2011).

During summer and fall, most whales in the ENP population feed in the Arctic (Chukchi, Beaufort, and Bering Seas) (Figure 3-3). An exception to this generality is the relatively small number (100s) of whales that summer and feed along the Pacific coast between Kodiak Island, Alaska and northern California (Darling 1984; Calambokidis et al. 2002; Gosho et al. 2011; Calambokidis et al. 2014). These whales include animals north of the PCFG area (i.e., northern British Columbia), as well as PCFG animals and ‘stragglers,’ ‘transients,’ or ‘visitors’ (IWC 2012e; Calambokidis et al. 2014; Carretta et al. 2014) that have only been seen feeding in the PCFG area in a single year (presumably using feeding grounds north of the PCFG area in other years). By late November, the southbound migration is underway as ENP whales begin to travel from summer feeding areas to winter calving areas associated with lagoons off the west coast of Baja California, Mexico, and the southeastern Gulf of California (Rugh et al. 2001; Swartz et al. 2006).

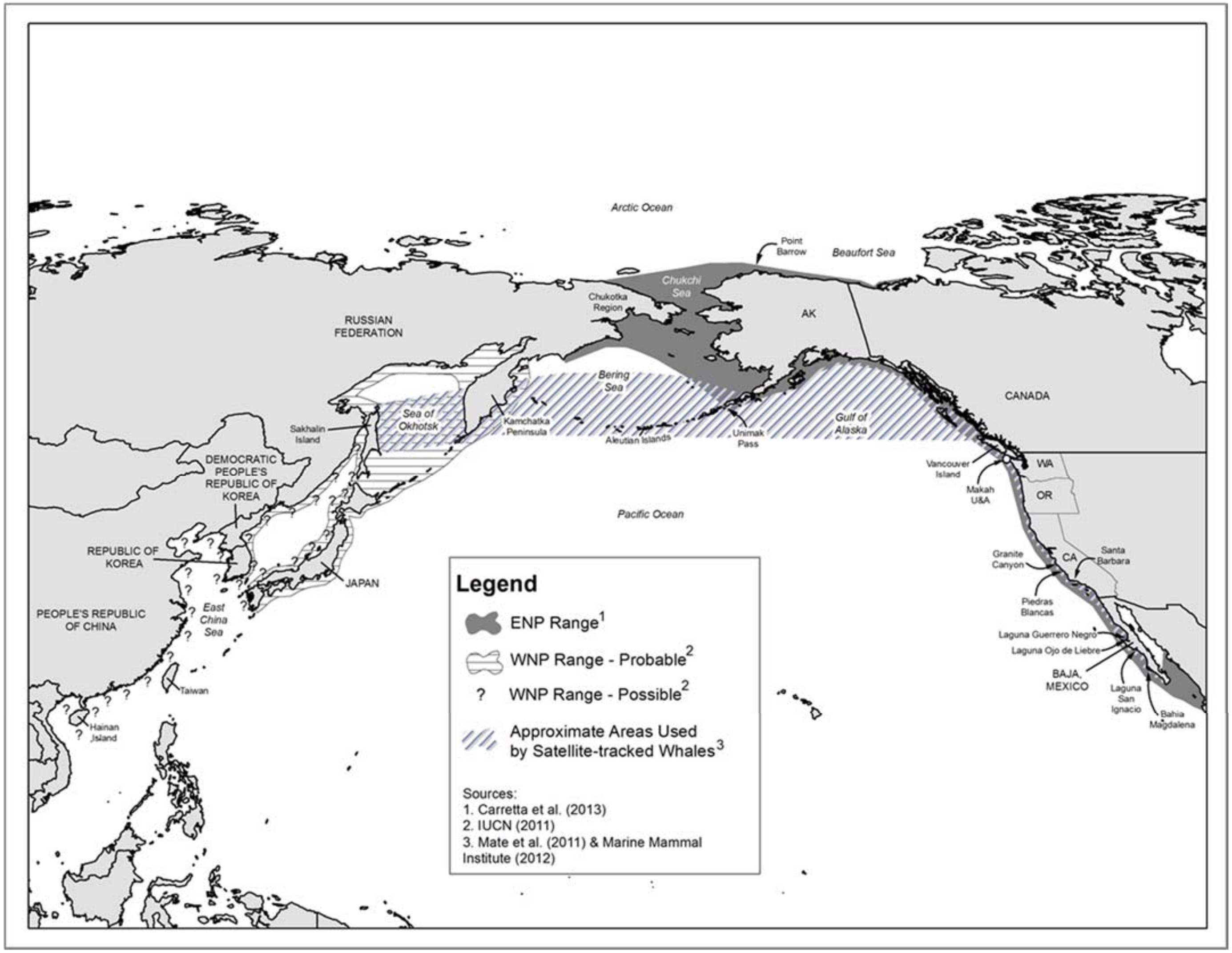

Figure 3-3. Approximate rangewide distribution of the ENP and WNP gray whale populations.

The distribution and migration patterns of gray whales in the WNP are less clear. The main feeding ground is in the Okhotsk Sea off the northeastern coast of Sakhalin Island, Russia, but some animals occur off eastern Kamchatka and in other coastal waters of the northern Okhotsk Sea (Figure 3-3) (Weller et al. 2002; Vertyankin et al. 2004; Tyurneva et al. 2010). Some WNP whales are thought to migrate south along the coast of Asia in the fall, but the migration route(s) and winter breeding ground(s) are poorly known. Information collected over the past century indicates that the gray whale range in the WNP is much more restricted at present than it was historically (Reeves et al. 2008), and that whales migrated along the coasts of Japan and South Korea (Andrews 1914; Mizue 1951; Omura 1984) to wintering areas somewhere in the South China Sea, possibly near Hainan Island (Wang 1984). No sightings off South Korea have been reported since 1977, however (Park 1995; Kim et al. 2013).

Recently, photo-identification (Urbán et al. 2012; Weller et al. 2012), genetic (Lang et al. 2010; Lang et al. 2011b), and telemetry studies (Mate et al. 2011) have documented that some gray whales observed on the feeding grounds in the WNP migrate to and from the ENP. Such documentation includes: 1) 6 whales photographically matched from off of Sakhalin Island to and off of southern Vancouver Island, 2) 2 whales genetically matched from samples off of Sakhalin to and off of Santa Barbara, California, 3) 13 whales photographically matched from off of Sakhalin Island to and in San Ignacio Lagoon, Mexico, and 4) 2 satellite-tagged whales that migrated from Sakhalin Island to the west coast of North America. In combination, these studies have recorded a total of 26 gray whales observed both at Sakhalin Island and in the ENP. Telemetry studies in 2010 to 2012 provide evidence of three whales migrating during the winter from the WNP to the ENP, with one whale tracked from the WNP to Baja Mexico and back to the WNP over the course of 408 days (August 2011 to October 2012) (Mate et al. 2011; Marine Mammal Institute 2012a).

Although these studies show that some whales use both the ENP and WNP, significant mtDNA and nuclear DNA differences exist between samples of whales summering in the WNP and samples of those summering in the ENP (Lang et al. 2011b). In addition, gray whales in the WNP and the ENP have exhibited different rates of recovery and levels of abundance following overexploitation as a result of commercial harvest (Rugh et al. 1999; Swartz et al. 2000; Swartz et al. 2006). Bickham et al. (2013) identified several hypotheses regarding the potential stock structure of North Pacific gray whales, and in April 2014 the IWC Scientific Committee convened a rangewide workshop that included a review of these and other hypotheses (IWC 2014c). A key objective of that meeting was to begin developing a modeling framework to better assess the status (including stock structure and movements) of North Pacific gray whales. Workshop participants reviewed a number of potential hypotheses for inclusion in the modeling framework and identified the following three as high priority given available data:

- Hypothesis 3a - Two breeding stocks (Asia and Mexico) may exist, although the Asian stock may have been extirpated. Whales show matrilineal fidelity to feeding grounds, and the Mexico stock includes three feeding sub-stocks: 1) PCFG; 2) Northern Bering-Southern Chukchi Seas/Northern Chukchi Sea/Gulf of Alaska; and 3) Sakhalin.
- Hypothesis 3e - Identical to hypothesis 3a except that the Asian breeding stock is extant and feeds off both coasts of Japan, Korea, and in the northern Okhotsk Sea west of the Kamchatka Peninsula. All whales off Sakhalin overwinter in the eastern North Pacific.
- Hypothesis 5a - Identical to hypothesis 3a, except that the whales that feed off Sakhalin include both whales that are part of the Asian stock and remain in the WNP year-round, and whales that are part of the Mexican stock and migrate to the ENP.

The IWC Scientific Committee is planning to reconvene in 2015 to review modeling results and continue its rangewide review of North Pacific gray whales (IWC 2014d).

3.4.3.1.3 <u>Population Exploitation, Protection, and Status</u>

Both WNP and ENP populations were greatly reduced by commercial whaling that began in the mid-19th century and continued as late as the 1960s for WNP whales (Swartz et al. 2006; Weller et al. 2002). For WNP gray whales, Yablokov and Bogoslovskaya (1984) speculated that pre-exploitation numbers may have numbered between 1,500 to 10,000 individuals, and Berzin and Vladimirov (1981) estimated only 1,000 to 1,500 remaining WNP gray whales by 1910; however, Weller et al. (2002) noted that it is unclear how these pre-exploitation and 1910 estimates were derived. Bradford (2003) concluded that at least 1,868 WNP gray whales were harvested in the 20th century, predominantly by commercial whalers off the Korean Peninsula between 1905 and 1935. WNP whales were thought to be extinct as recently as the 1970s (Bowen 1974); however, more recent reports and research efforts indicate that a relic WNP population still exists, though it is quite small (Weller and Brownell 2012; Cooke et al. 2013).

From 1845 to about 1900, American whalers hunted gray whales in the ENP from the winter grounds in Baja to the summer feeding areas in the subarctic. Scammon (1874) and Henderson (1984) estimate that approximately 11,300 whales were killed from the population between 1845 and 1874. A more recent assessment by Reeves et al. (2010) estimates that the number of gray whales killed was likely lower (between 6,124 and 8,021 animals) and may not have accounted for calves that were killed or orphaned and presumably died. Punt and Wade (2012) reported a similar commercial catch estimate of 8,300 gray whales between 1846 and 1874 and noted that catch estimates prior to 1930 are subject to considerable uncertainty. Hunts in and near the Baja California lagoons greatly reduced the reproductive capacity of the population by killing the females with calves (Swartz et al. 2006; Reeves et al. 2010). From approximately 1914 to 1946, modern industrial whaling by the United States, Japan, Norway, and the Soviet Union in the North Pacific took an estimated 940 gray whales (Reeves 1984). Estimates of ENP gray whale population size (i.e., abundance) before commercial exploitation vary. Henderson (1984) estimated that the original population was between 15,000 and 20,000 whales. Reilly (1981) estimated that there may have been 24,000 gray whales before 1846. Scammon (1874) proposed that the population numbered about 30,000 whales from 1853 to 1856. After the heavy exploitation of gray whales, especially from 1855-74, the abundance may have dropped to only a few thousand animals (Henderson 1984).

Recently, Alter et al. (2007 and 2012) used estimates of genetic diversity to infer that the pre-whaling abundance of gray whales may have been approximately three to five times more numerous than today's average census size. Alter et al. (2007) note that their estimate likely measures both the ENP and WNP stocks together, and that an important question is whether carrying capacity has declined over time. If it has, then ENP gray whales may be reduced from historical numbers, but may have reached a new, lower carrying capacity today (refer to Subsection 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates).

Estimates of ENP gray whale population size after commercial exploitation vary. Reilly (1981) estimated that the population declined to below 12,000 whales; Henderson (1984) estimated that the population did not exceed 8,000 to 10,000 whales; and Butterworth et al. (2002) estimated a number between 4,000 to 5,000 whales, down to as low as 1,500 to 1,900 whales after commercial whaling stopped in 1937 and 1938. Since then, gray whales have been protected pursuant to a suite of international agreements and federal laws (refer to Subsection 1.2, Legal Framework). The list below includes a summary of these efforts and expands on the protection provided under the ESA. Although ENP gray whales were removed from the ESA list of endangered species in 1994, the history of their listing and de-listing provides relevant context for analysis of the Makah Tribe's request.

1. <u>1937 International Agreement for the Regulation of Whaling</u> — The 1937 Agreement protected gray whales from commercial whaling, but included an exception to allow for aboriginal subsistence use. Norway, the United States, and others signed the Agreement in 1937 (Reeves 1984), and Canada, the Soviet Union, and Japan signed it later (1938,

1946, and 1951, respectively). Consequently, since 1951, all nations with factory ships operating in the North Pacific Ocean have been subject to the provisions protecting gray whales from commercial whaling (Reeves 1984). During the fall southward and spring northward migrations between 1959 and 1969, scientists in the United States took 316 gray whales off the coast of central California under IWC special research permits to establish the status of the population (Rice and Wolman 1971).

2. 1946 International Convention for the Regulation of Whaling — The ICRW continued the 1937 Agreement's prohibition on commercial whaling of gray whales, as well as allowing aboriginal subsistence whaling (refer to Subsection 1.2.4.1, International Whaling Governance under the ICRW for more detail).

3. Whaling Convention Act — The WCA prohibits commercial whaling and authorizes aboriginal subsistence whaling consistent with the IWC Schedule (i.e., regulations of the IWC that are an integral part of the ICRW) (refer to Subsection 1.2.4, Whaling Convention Act, for more detail).

4. Endangered Species Act — The gray whale (i.e., the entire taxonomic species) was listed as an endangered species under the statute preceding and replaced by the ESA (35 Fed. Reg. 8495, June 2, 1970). Following a comprehensive evaluation of its status (Breiwick and Braham 1984), NMFS concluded on November 9, 1984 (49 Fed. Reg. 44774) that the population should be listed as threatened, instead of endangered. On November 22, 1991, NMFS proposed to remove the gray whale population from the list of endangered and threatened wildlife (56 Fed. Reg. 58869). NMFS published a final notice of determination (58 Fed. Reg. 3121, January 7, 1993) to remove the population from the list because the species had recovered to near its estimated original population size and was neither in danger of extinction throughout all or a significant portion of its range, nor likely to again become endangered within the foreseeable future. On June 16, 1994 (59 Fed. Reg. 21094), the ENP gray whale population was formally removed from the list of endangered and threatened wildlife (however, the WNP stock remained on the list as an endangered species). As required under section 4(g) of the ESA, we drafted a plan to monitor the status of the ENP stock for at least 5 years following the delisting. A comprehensive status review, completed in August of 1999, recommended that the population continue under a non-threatened classification (Rugh et al. 1999).

In 2001, we received a petition to relist the gray whale under the ESA, but found that the petition did not present substantial scientific or commercial information indicating that relisting was warranted (66 Fed. Reg. 32305, June 14, 2001). We have continued monitoring the population since delisting.

5. Marine Mammal Protection Act — The MMPA established a moratorium on the taking of all marine mammal species, including gray whales, with certain exemptions and exceptions (Subsection 1.2.3, Marine Mammal Protection Act). The agency publishes annual stock assessment reports for gray whales and other marine mammals as required by section 117 of the MMPA (Subsection 3.4.2.1.6, Stock Assessment Reports).

   On October 21, 2010, NMFS received a petition requesting a status review under the MMPA for the ENP stock of gray whales, but found that the petition did not present substantial information indicating that a status review may be warranted (75 Fed. Reg. 81225, December 20, 2010). NMFS released the most recent stock assessment report for ENP gray whales in August 2014 (Carretta et al. 2014). The report was reviewed by the independent scientific review group and made available for comment by the Marine Mammal Comission and the public. This report, along with the scientific information cited therein, summarizes the best available scientific information on the status of the ENP gray whale stock.

The WNP population was listed as critically endangered by the IUCN in 2000 (Hilton-Taylor 2000; Reilly et al. 2000; Baillie et al. 2004). The most recent population assessment (Cooke et al. 2013) resulted in a median 1+ (non-calf) estimate of 140 individuals, with a 95 percent confidence interval of 134 to 146 individuals. The estimated realized average annual rate of population increase over the last 10 years (2002 to 2012) is 3.3 percent per annum (±0.5 percent).

In contrast, the ENP population is thought to have recovered to pre-exploitation numbers, and it was removed from the endangered species list in 1994 (59 Fed. Reg. 21094, June 16, 1994) after 3 decades of research supported the conclusion that it had recovered (Buckland and Breiwick 2002). The most recent abundance estimate for the ENP population is 20,990 whales (Durban et al. 2013). Punt and Wade (2012) estimated the ENP population was at 85 percent of carrying capacity (K), and at 129 percent of the maximum net productivity level (MNPL), with a probability of 0.884 that the population is above MNPL and therefore within the range of its optimum sustainable population (OSP).

Based on their conclusion that there may have been as many as 118,000 gray whales historically, Alter et al. (2007) recommended the ENP stock be designated as depleted. NMFS rejected this recommendation for the following reasons: 1) the conclusions of Alter et al. (2007) included both the WNP and the ENP, and may have included Atlantic gray whales as well, whereas NMFS stock assessments are based on individual stocks and "it is speculative to try to determine what proportion of the estimated abundance may have been in the eastern or western populations," and 2) NMFS relies on current carrying capacity in making MMPA determinations and "an estimate of stock abundance 1,100 to 1,600 years ago is not relevant to MMPA decision-making, even if such an estimate were available."

We do not presently recognize PCFG whales as a separate population stock, but we have determined that these whales appear to be a distinct feeding aggregation and may warrant consideration as a distinct stock in the future (Carretta et al. 2014). Given this possibility, and because the Tribe's request specifically addresses the potential for "local depletion" of gray whales in the Tribe's U&A, we have included PCFG-related sections in this EIS where appropriate.

3.4.3.1.4 Feeding Ecology and Role in the Marine Ecosystem

Gray whales use various feeding techniques, including 1) suction feeding, also called benthic feeding or bottom feeding, which allows them to feed on crustaceans that live burrowed in (infauna) and just above (epifauna) the sea floor; and 2) engulfing or skimming prey in the water column and on the sea surface. This broad foraging capability allows gray whales to feed on a wide variety of prey throughout their range (Nerini 1984; Darling et al. 1998; Dunham and Duffus 2001; Moore et al. 2003; Moore et al. 2007; Budnikova and Blokhin 2012). Pyenson and Lindberg (2011) hypothesized that flexibility in feeding modes and migratory behavior allowed gray whales to survive major, glacially driven changes in sea levels and available foraging habitat during the Pleistocene. Such flexibility may account for the gray whale's more rapid recovery from commercial whaling when compared with other large whale species (Nerini 1984; Moore et al. 2001).

Gray whales regularly consume benthic prey (Nemoto 1970; Nerini 1984), often creating furrows or pits and leaving a tell-tale plume of mud in the water column (Johnson and Nelson 1984; Nerini 1984; Kvitek and Oliver 1986; Weitkamp et al. 1992). Gray whales display an adaptation to bottom feeding because their baleen plates are thicker and the hairs are coarser and stronger than those of other whales. This allows them to excavate coarse bottom sediments on a regular basis (Nemoto 1959; Nerini 1984). Nerini (1984) and more recently Budnikova and Blokhin (2012) and Budnikova et al. (2013) listed prey obtained from gray whale stomachs comprising up to 33 genera, including a wide variety of benthic and epibenthic invertebrates, such as amphipods, decapods, molluscs, polychaete worms, algae, and sponges. Moore et al. (2007) and Gosho et al.

(2011) also recently documented tens to hundreds of gray whales feeding off Kodiak Island, primarily on epibenthic marine crustaceans commonly referred to as hooded shrimp. Fadeev (2011) and Vladimirov et al. (2012) noted that the primary prey of WNP gray whales are benthic amphipods, but noted circumstantial evidence that they also feed on sandlance near Sakhalin's Piltun Lagoon. In the PCFG area, various studies have affirmed that gray whales are opportunistic foragers on a wide variety of prey species, including mysids, crab larvae, amphipods, ghost shrimp, clams, and herring eggs/larvae (Murison et al. 1984; Darling et al. 1998; Dunham and Duffus 2002; Nelson et al. 2008; Newell 2009; Feyrer 2010; Feyrer and Duffus 2011; Lindsay 2013).

Excavation of bottom sediments by feeding gray whales may play a role in maintaining the benthic habitat in some areas, though its relative importance is not clear. Some investigators hypothesize that gray whale benthic feeding may help maintain the substrate (Johnson and Nelson 1984; Oliver and Slattery 1985), or otherwise have an important influence on the benthic community (Nelson and Johnson 1987; Grebmeier et al. 1989). Excavated sites also trap woody debris, which affects benthic productivity (Oliver and Slattery 1985). Gray whale excavation has been proposed as a major source of disturbance and part of a cycle of exploitation, recolonization, succession, and maturing of the prey community (Nerini 1984; Oliver et al. 1984; Oliver and Slattery 1985). Conversely, some investigators have proposed that the growing gray whale population has reached carrying capacity and that the population's overexploitation of benthic amphipods in the Bering Sea may have led to a decrease in amphipod abundance during a documented period from 1986 to 1988 (Highsmith and Coyle 1992). It has further been suggested that gray whale foraging can lead to localized loss of amphipod or other prey communities, forcing whales to forage elsewhere (Highsmith and Coyle 1992; Weitkamp et al. 1992; Feyrer 2010; Feyrer and Duffus 2011). In the project area, gray whales may be feeding on both pelagic and benthic prey (Lindsay 2013; Scordino et al. 2014a).

Gray whales excavating the benthos may also make food available for surface-feeding seabirds. As the whales stir up the benthos, particularly in shallow waters, feed rises to the surface. Observations in the Bering Sea suggested this association (e.g., Grebmeier and Harrison 1992), but no similar observations have been made in the project area. When gray whales die, decomposing whale carcasses also deliver large pulses of organic material to the seafloor. This material may serve as islands of habitat for unique assemblages of deep-sea macrofauna (Dahlgren et al. 2004; Goffredi et al. 2004). Barrett-Lennard et al. (2011) speculated that the frequent occurrence of gray whale carcasses (as a result of predation by killer whales) in shallow waters and beaches near Unimak Pass, Alaska, may affect the structure of bear and shark populations that scavenge on the remains. These authors also report on an apparent shallow water carcass-storing behavior that may promote the development and cultural transmission of specialized feeding behaviors by the area's killer whale population.

Although gray whales are consistently characterized as benthic feeders in the literature, they also feed on pelagic prey, including mysid crustaceans, crab larvae, herring eggs and larvae, sandlance, ghost shrimp, and euphausiids (Murison et al. 1984; Nerini 1984; Oliver et al. 1984; Weitkamp et al. 1992; Duffus 1996; Darling et al. 1998; Benson et al. 2002; Dunham and Duffus 2002; Stelle et al. 2008; Newell 2009; Brownell et al. 2010; Feyrer and Duffus 2011; Lindsay 2013; Scordino et al. 2014a). They feed in the water column by making short dives and random movements in kelp beds and within the surf zone of rock and islets (Murison et al. 1984; Nerini 1984; Darling 1998). When they skim feed on the sea surface, they move along the surface, biting down on plankton streams along the tide line (Darling 1998).

Over the years, researchers have observed gray whales aggregating in particular areas to feed where prey densities are high, especially in areas of benthic prey densities in the northern seas (e.g., Berzin 1984; Yablokov and Bogoslovskaya 1984; Clarke and Moore 2002; Moore et al. 2000; Moore et al. 2003; Highsmith et al. 2007). The term 'feeding aggregation' has been used in scientific literature to describe these concentrations of feeding whales (e.g., Berzin 1984; Calambokidis et al. 2002). Areas where whales congregate to feed on a regular basis have been referred to as 'feeding grounds' or 'feeding areas' (e.g., Berzin 1984; Calambokidis et al. 2002; Moore et al. 2003; Calambokidis et al. 2004a), though the whales also feed continuously along their migration route. Some scientists have proposed that whales primarily feed on benthic prey in higher latitudes and switch to pelagic prey in lower latitudes (Nerini 1984), or that prey are in primary, secondary, or tertiary feeding grounds with pelagic prey occurring further south in the range (Kim and Oliver 1989). Others have proposed that whales select pelagic prey first when available because it is easier to obtain than benthic prey (Dunham and Duffus 2001). Dunham and Duffus (2001) hypothesize that pelagic prey concentrate in the water column, making a relatively easy filter-feeding target, and that the distribution of pelagic prey is not as patchy or unpredictable as benthic prey.

Rather than exhibiting strong regional or prey-type preferences, whales probably exhibit highly plastic and opportunistic foraging behavior using a variety of prey resources, both benthic and pelagic, within a given feeding area (Darling et al. 1998; Dunham and Duffus 2001, 2002; Fadeev 2011; Feyrer and Duffus 2011; Vladimirov et al. 2012). After 26 years of observations off the southwest coast of Vancouver Island, some researchers noted that whales could be observed feeding in discrete pockets of habitat over short time frames, depending on prey availability. Over longer time frames, however, virtually all of the southwest coast study area was used by feeding gray whales (Darling et al. 1998; Dunham and Duffus 2001). Darling et al. (1998) proposed that gray whales are attuned to natural patterns of abundance and absence occurring within a prey assemblage and that different prey species play equal roles over a season or several years.

The best available information indicates that feeding aggregations (the whales) and feeding areas (the prey) are dynamic, with both small- and large-scale changes over time and space. Gray whales change location and habitat to exploit the optimum prey species at any one time, based on abundance, density, size, caloric content, and predation pressure. Such factors may vary by season and year, depending on environmental variability and the population dynamics of prey (Darling et al. 1998; Clarke and Moore 2002; Moore et al. 2007).

3.4.3.1.5 Reproduction and Calf Production

Gray whale breeding and calving are seasonal and closely synchronized with migratory timing. Sexual maturity is attained between 6 and 12 years of age (Rice 1986; Rice and Wolman 1971; Bradford et al. 2010). The sexual cycle in female gray whales lasts approximately 2 years and includes copulation, pregnancy, lactation, and a resting period after reproduction (Yablokov and Bugoslovskaya 1984). A calf therefore can be produced every other year. The sexual cycle is tied to annual migrations and environmental conditions favorable for the early development of calves (Swartz 1986; Swartz et al. 2006). Both male and female gray whales are promiscuous breeders and copulate repeatedly with more than one mate (Jones and Swartz 1984). Mating behavior is observed during most seasons (Gilmore 1960; Rice and Wolman 1971; Jones and Swartz 1984; Swartz 1986; Berta and Sumich 1999).

Female gray whales come into estrous primarily during a 3-week period from late November to early December, which coincides with the onset of the southward migration from the summer feeding grounds to wintering grounds (Rice and Wolman 1971; Shelden et al. 2004). At this time, ENP whales are known to congregate in nearshore areas of the summer feeding range at or near the top of the migratory corridor, possibly to find mates (Swartz et al. 2006). The mean conception date is approximately December 5 (Rice and Wolman 1971). Mating occurs throughout the southward migration in the migratory corridor. Females that have not successfully bred may enter a second estrous cycle within 40 days (Rice and Wolman 1971), such that a few females may breed as late as the end of January while present on the winter grounds (Jones and Swartz 1984). Estrous females and mature males in the second breeding cycle have been observed in Baja lagoons at highest densities near lagoon inlets and in adjacent coastal waters (Swartz et al. 2006). The gestation period lasts approximately 13.5 months (or approximately 418 days) (Rice et al. 1984), so newly pregnant females can calve about a year later during the winter.

As noted previously, we have a poor understanding of the migration route(s) and winter breeding ground(s) used by gray whales in the WNP. It was believed that these whales migrate along the coasts of Japan and South Korea (Andrews 1914; Mizue 1951; Omura 1984) to wintering areas somewhere in the South China Sea, possibly near Hainan Island (Wang 1984). More recent information from photo-identification and genetic and telemetry studies indicates that some whales may winter in the ENP (refer to Subsection 3.4.3.2.1, WNP Seasonal Distribution, Migration, and Movements).

In contrast, we have a much better understanding of the migration route and breeding grounds used by ENP whales. Some gray whales in the ENP calve in the shallow, protected lagoons of Baja Mexico (often referred to in scientific literature as birthing lagoons, calving lagoons, or breeding lagoons), starting around December 26 and ending approximately at the beginning of March (Swartz and Jones 1983; Sánchez-Pacheco 1998), with a median birth date around January 27 (Rice and Wolman 1971). Since the late 1970s and early 1980s, calf sightings have increased near Carmel (Shelden et al. 2004) and scientists currently believe that perhaps one-quarter to one-half of the calves are born north of Carmel (well north of the Baja lagoons) during the southward migration (Shelden et al. 2004). Shelden et al. (2004) propose that some mothers that reach parturition along the southward migration may winter with their calves in the Southern California Bight, near the Channel Islands, until the calves are large enough to return north.

Calves are approximately 15 feet (4.6 m) long and weigh 1,000 pounds (454 kg) at birth (Rice 1986). The sex ratio of calves is 1:1 for the ENP gray whale, but it is closer to 68 percent males and 32 percent females for WNP gray whales (Rice and Wolman 1971; Jones and Swartz 1984; Weller et al. 2005). The mothers' rich milk is more than 50 percent fat and nourishes the calves for several weeks while they prepare for the long northward migration to summer feeding areas. Calves are weaned and become independent by 6 to 8 months of age while on the summer feeding ground (Rice and Wolman 1971; Calambokidis et al. 2010). Gray whale calves are approximately 28 to 30 feet (8.5 to 9.1 m) long before migrating southward (Rice 1986).

Gray whale calf production trends have been monitored in the ENP using three methods:

1. Surveying for calves from shore and from aircraft in central California during the northward migration (Perryman et al. 2002; Perryman et al. 2004; Perryman et al. 2011; Perryman and Weller 2012)
2. Counting calves from shore at Granite Canyon, California during the southward migration (Shelden et al. 1995; Shelden and Rugh 2001; Shelden et al. 2004)
3. Conducting aerial and vessel surveys for calves in the lagoons of Baja California, principally Laguna Guerrero Negro, Laguna Ojo de Liebre (most occupied), Laguna San Ignacio, and the Bahia Magdalena Lagoon complex (Urbán-Ramírez et al. 2003; Urbán-Ramírez et al. 2010; Rosales-Nanduca et al. 2012; Swartz et al. 2012)

NMFS' Southwest Fisheries Science Center conducted shore-based sighting surveys of northward migrating whales from 1994 to 2012 to estimate the number of calves passing Piedras Blancas, California (Perryman and Weller 2012). Additional research included aerial surveys to determine offshore distribution in 1994 and 1995, and concurrent replicate watches near the peak of each migration to estimate sightings missed by the standard watch team (Perryman et al. 2002). Data from these surveys, including calf counts, corrected calf estimates (to account for periods not on watch and for calves missed), and calf production indices (calf estimate/total population estimate) are summarized in Table 3-2 and illustrated in Figure 3-4.

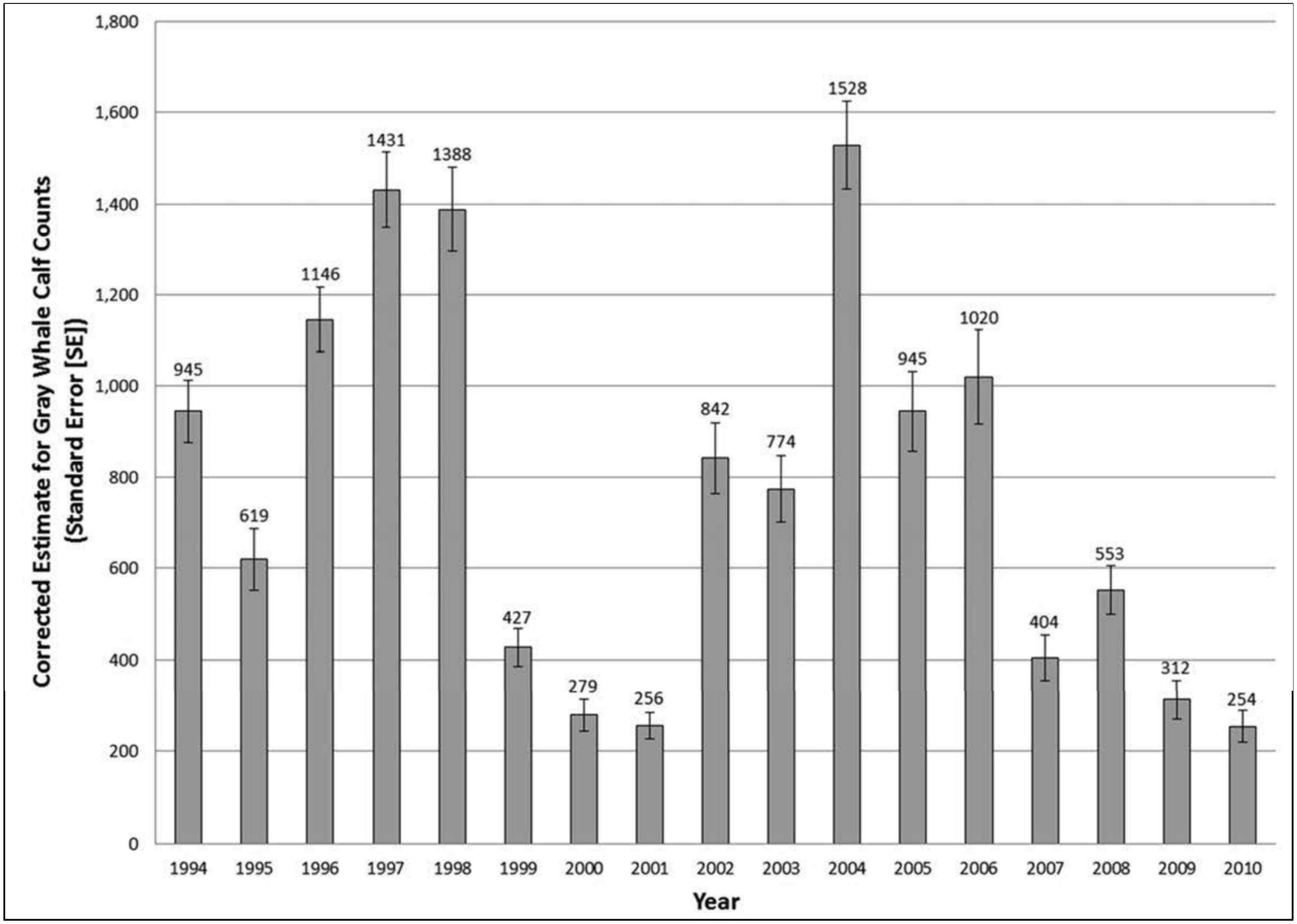

Figure 3-4. Gray whale calf counts off Piedras Blancas, California, 1994 to 2010 (from data in Perryman et al. 2011).

Table 3-2. Summary of gray whale calf counts off Piedras Blancas, California, 1994 to 2010[1].

Year	Calf Counts[2]	Corrected Estimate (standard error)	Calf Production Index (%)
1994	325	945 (68.20)	4.70
1995	194	619 (67.20)	3.02
1996	407	1,146 (70.70)	5.47
1997	501	1,431 (82.00)	6.80
1998	440	1,388 (92.00)	6.57
1999	141	427 (41.10)	2.18
2000	96	279 (34.80)	1.55
2001	87	256 (28.56)	1.56
2002	302	842 (78.60)	5.25
2003	269	774 (73.56)	4.65
2004	456	1,528 (96.00)	8.85
2005	343	945 (86.90)	5.28
2006	285	1,020 (103.30)	5.51
2007	117	404 (51.20)	2.11
2008	171	553 (53.11)	2.89
2009	86	312 (41.93)	1.63
2010	71	254 (33.94)	1.33

1 Perryman and Weller (2012) presented unpublished preliminary estimates (corrected) for 2011 and 2012 of 854 and 1,100 calves, respectively.

2 Calf counts are corrected calf estimates and calf production index (calf estimate/total population estimate) for northbound migrating gray whale calves.

Source: Perryman et al. 2011

The calf estimates and calf production index in the ENP indicate that the gray whale population experienced periods of decreased production from 1999 to 2001 and 2007 to 2010. The 1999 to 2001 period coincides with an unusual mortality event that resulted in numerous stranded gray whales in 1999 and 2000 (Gulland et al. 2005) (Subsection 3.4.3.1.7, Strandings). It is apparent that, although calf production dipped from 1999 to 2001, it seems to have recovered during 2002 to 2006 (Table 3-2). Perryman et al. (2011) noted the high interannual variability in calf production between 1995 and 2011, but found no sign of a positive or negative trend over that time period. They did find a significant linear correlation between average ice cover in the Bering Sea and northbound calf estimates the following spring. Their results explain roughly 70 percent of the interannual variability in calf counts and suggest that a late retreat of seasonal ice may limit access to prey for pregnant females and reduce the probability that existing pregnancies will be carried to term.

Additional evidence of changes in calf production comes from observations at the Mexican calving lagoons. Annual cow-calf counts by Urbán-Ramírez et al. (2010) in two of the lagoons (San Ignacio and Ojo de Liebre) closely reflect the variability seen during the 1994 to 2010 period monitored by Perryman et al. (2011), including the steep decline in 1999 to 2001 coincident with the unusual mortality event (Figure 3-5). The data for Laguna Ojo de Liebre also suggests that there was a significant rebound in cow-calf pairs during 2002 to 2006 (nearly 900 pairs in 2004) followed by another decline to low counts (less than 200 pairs) in 2010 (Urbán-Ramírez et al. 2010). More recently, Swartz et al. (2012) reported that maximum counts of cow-calf pairs in Laguna San Ignacio during 2011 to 2012 were 175 to 232 percent higher than the 2007 to 2010 average counts, and that more females appear to be using this lagoon (including females that gave birth elsewhere). These authors speculated that increasing numbers of cow-calf pairs might be a result of new, mature females replacing those that were lost during the 1999 to 2000 unusual mortality event. Swartz et al. (2012) also noted that observations of healthy “fat” calves and few “skinny” adults in Laguna San Ignacio in 2011 and 2012 suggests that gray whale females have found adequate prey resources during recent summers.

Calf production in the WNP has been monitored annually since 1995 during photo-identification surveys off Sakhalin Island. The numbers seen are very small, ranging from a low of 2 calves in 1995 to 15 calves in 2011 (Table 3-3; Figure 3-6) (Burdin et al. 2012; Mate et al. 2011). Unlike the California/ENP counts described above, these WNP counts represent calves that reached the Sakhalin feeding grounds but not those that perished during the potentially lengthy migration from birthing areas. Bradford et al. (2010) reported that in more than a decade of monitoring off Sakhalin Island there have been only two gray whales—out of 17 females first sighted as calves or yearlings potentially mature in 2009—observed to have produced a calf, establishing the first observed values of WNP gray whale age at first reproduction as 7 and 11 years.

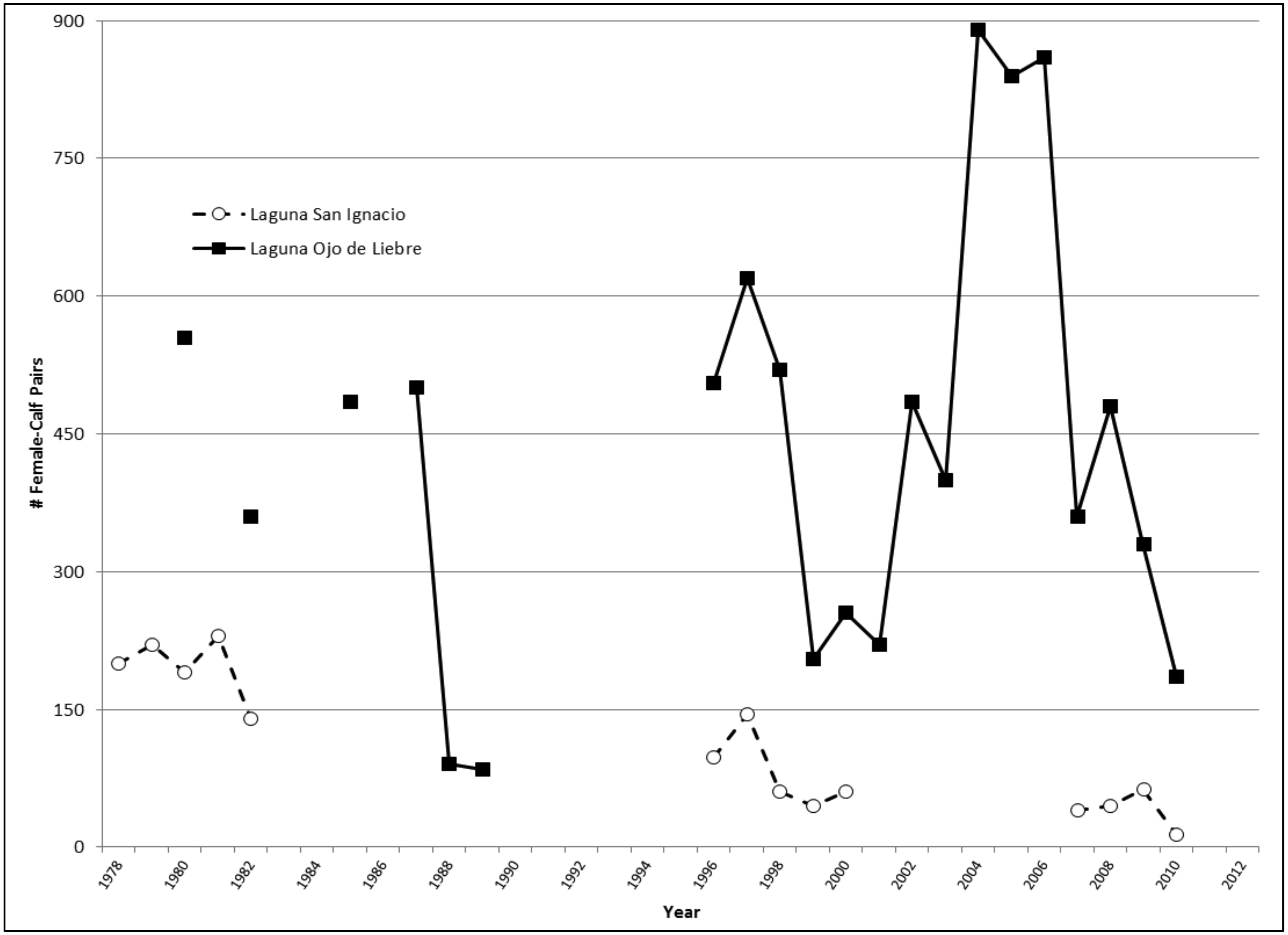

Figure 3-5. Number of female-calf pairs counted in San Ignacio and Ojo de Liebre Lagoons, 1978-2010. Lines between points represent surveys in continuous years. (Adapted from Urbán-Ramírez et al. 2010).

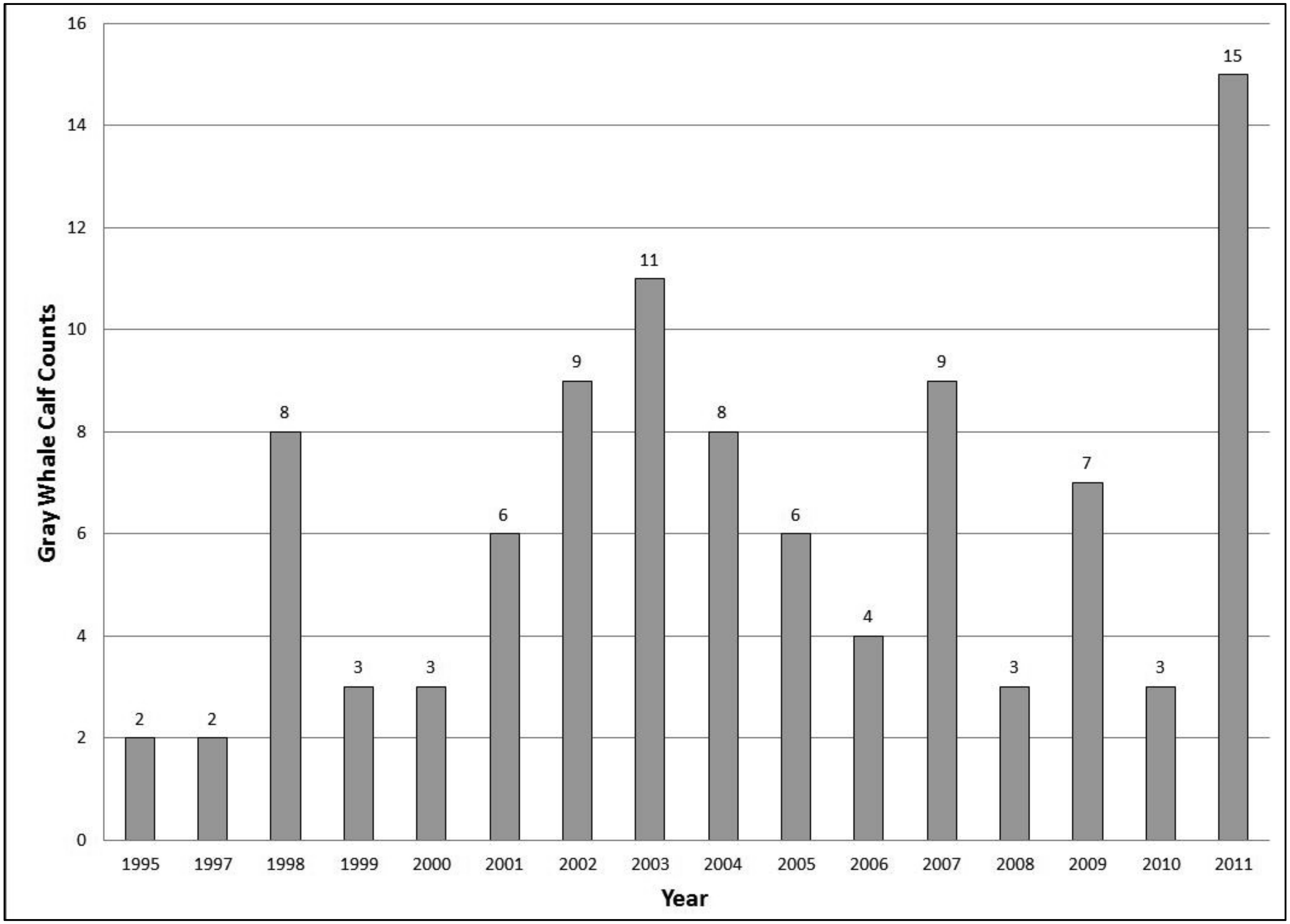

Figure 3-6. Gray whale calf counts off Sakhalin Island, Russia, 1995 to 2010.

Table 3-3. Summary of gray whale calf counts off Sakhalin Island, Russia, 1995 to 2011.

Year	Calf Counts	Whales Identified
1995[1]	2	28
1997	2	47
1998	8	54
1999	3	69
2000	3	58
2001	6	72
2002	9	76
2003	11	75
2004	8	94
2005	6	93
2006	4	79
2007	9	83
2008	3	45
2009	7	82
2010	3	42
2011[2]	15	83

[1] Data from 1995 were pilot in nature and are thereby viewed as incomplete for some of the reported values.
[2] Total of 15 calves identified in 2011 when data collected during a separate satellite tagging study (see Mate *et al*. 2011) are included.
Source: Burdin et al. 2012

3.4.3.1.6 Natural Mortality

In addition to human harvests of gray whales (e.g., refer to Table 3-38, Aboriginal Subsistence Whaling Catches Since 1985), sources of natural mortality for gray whales include predation, disease, entrapment in ice, and starvation. In their recent assessment of the ENP stock, Punt and Wade (2012) estimated that the annual natural mortality of non-calf animals is approximately 2 percent in a normal year. Killer whales are the primary natural predators of gray whales. Wade et al. (2007) reported that all of the observed predation events by killer whales on large baleen whales involved gray whales along the western coast of North America, in the Bering Sea, and near the Aleutian Islands. In the WNP, Weller et al. (2009) reported that gray whales had a relatively high incidence of killer whale tooth scars compared to similar estimates made for other baleen whale populations. There are many anecdotal reports of killer whale interactions with gray whales, but it is difficult to quantify the proportion of the gray whale stock killed or approached by killer whales each year (Rice and Wolman 1971; Fay et al. 1978; Jones and Swartz 1984; Poole 1984; Goley and Straley 1994; George and Suydam 1998). Recent studies indicate that killer whale predation could be common in certain locations. In the False Pass-Unimak Island region of Alaska, over 100 transient killer whales amass in the spring to feed on migrating gray whales (Matkin et al. 2007). In May to early June in 2003 and 2004, Matkin et al. (2007) reported killer whales taking gray whales more frequently than any other species, with 19 harassments, of which 18 resulted in kills. Barrett-Lennard et al. (2011) also found that the gray whales migrating past Unimak Island were vulnerable to predation by killer whales. They observed four gray whales killed and three gray whales harassed by killer whales; attacks would sometimes be terminated after brief harassments. All observed attacks occurred in deep water, where young-of-the-year calves and juveniles were selectively attacked. Killer whale attacks on gray whales were also the most frequently observed predation event off the Chukotka Peninsula (Melnikov and Zagrebin 2005). Of the 92 observed killer whale attacks on marine mammals, 66 percent were on gray whales with nearly 80 percent of them resulting in kills (Melnikov and Zagrebin 2005). In a recent study by Wade et al. (2007), gray whales accounted for approximately 8 percent of 466 observed predation events by transient killer whales off the west coast of North America; calves and juvenile gray whales were taken preferentially over adults.

Predation by transient killer whales has been suggested as a significant cause of gray whale calf mortality (Barrett-Lennard et al. 2011). Several studies suggest that gray whale calves may be particularly vulnerable during their northward (spring) migration (Ternullo and Black 2002; Ford and Reeves 2008). The majority (85 percent) of the gray whales killed off the Chukotka Peninsula were juveniles (Melnikov and Zagrebin 2005). Of the 15 killer whale attacks described in Ford and Reeves (2008), 14 involved groups of gray whales, and eight involved mothers with young calves. Barrett-Lennard et al. (2011) speculate that gray whale migration patterns likely shift over time because of changes in the distribution and abundance of transient killer whales. For example, these authors suggest that gray whales behave most cryptically and follow shorelines most closely in areas where they have encountered killer whales in the past. Gray whale responses to predatory attacks by killer whales have included swimming towards shore, rolling and turning, slashing their tail flukes, or a female gray whale would defend her young by interposing her body between the killer whales and her calf (Ford and Reeves 2008; Barrett-Lennard et al. 2011).

Other predators of gray whales are sharks, including the great white shark (*Carcharodon carcharias*) and tiger shark (*Galaeocerdo cuvier*) (Jones and Swartz 2002), but the impact of such predation is not known.

3.4.3.1.7 Strandings

A stranding is an event where a marine mammal is dead on a beach or shore or in water within the U.S. EEZ, or a marine mammal is alive on a beach or in shallow water within the EEZ, but is unable to return to its natural habitat without assistance (50 CFR 216.3). In the 1992 MMPA

Amendments, Congress designated NMFS as the lead agency to coordinate a Marine Mammal Health and Stranding Response Program. Through the Marine Mammal Stranding Network, we oversee, coordinate, and authorize volunteers from non-profit organizations, aquaria, universities, the Makah Tribe, and state and local governments to respond to marine mammal strandings throughout the coastal states. The NMFS Marine Mammal Health and Stranding Response Team also coordinates with partners in neighboring countries when strandings cross national lines. Stranding network volunteers collect and report stranding data to NMFS, and we maintain a database of gray whale stranding records for Alaska, Washington, Oregon, and California. We also have access to stranding data from Canada and Mexico, but only limited access to stranding data from Asia. Strandings are known to occur in the WNP (see review by Weller and Brownell 2012); however, the information is not recorded in a consistent fashion as is done for whales in the ENP.

Annual gray whale stranding data from Alaska to Mexico[6] for the years 1995 to 2011 are in Table 3-4 and Figure 3-7. The number of gray whale strandings along the west coast of North America averaged 41 animals from 1995 to 1998. Stranding detection effort during these times was not directed; reports were compiled from opportunistic reports that were later relayed to NMFS' regional stranding coordinators (Gulland et al. 2005). In 1999 and 2000, gray whales stranded dead, or moribund, in unprecedented numbers from Alaska to Baja California, Mexico, with the highest numbers reported in Mexico and Alaska (Norman et al. 2000; Gulland et al. 2005). For comparison, 29 dead gray whales were found on the Alaska coast in 1989 during surveys associated with assessment of impacts caused by the *Exxon Valdez* oil spill (Loughlin 1994). The 1999 and 2000 strandings and the subsequent return to normal conditions from 2002 through 2011 are discussed in detail below.

[6] We requested, but did not receive, recent stranding data from researchers in Mexico; we are unaware of any information indicating that strandings have been unusually high or low there in recent years.

Table 3-4. Summary of ENP gray whale stranding data from Alaska to Mexico, 1995 to 2011.

	REGION						
YEAR	**Alaska[1]**	**Canada**	**Washington**	**Oregon**	**California**	**Mexico**	**Total**
1995	1	2	7	4	12	13	**39**
1996	0	0	2	3	13	3	**21**
1997	3	5	3	3	10	22	**46**
1998	3	2	4	0	30	17	**56**
1999	62	10	28	3	45	124	**272**
2000	53	22	23	2	59	207	**366**
2001	5	1	1	0	5	10	**22**
2002	0	0	2	3	7	15	**27**
2003	5	4	3	2	8	NA	**≥22**
2004	1	2	2	4	17	2	**28**
2005	4	3	11	5	7	12	**42**
2006	9	2	8	4	12	NA	**≥35**
2007	2	2	4	2	12	NA	**≥22**
2008	5	0	2	2	8	NA	**≥17**
2009	10	1	4	3	10	NA	**≥28**
2010	16	4	7	2	11	NA	**≥40**
2011	8	3	4	2	6	NA	**≥23**

NA – not available

[1] Data shown do not include 20 unconfirmed strandings between 2000 to 2009 (9 of which occurred in 2000). Also, the remoteness of much of Alaska's coastline (as well as the coasts of Canada and Mexico) may limit the ability to detect strandings, in contrast to the more comprehensive coverage along the Oregon, Washington, and California coasts.

Sources: Gulland et al. 2005; S. Stone, pers. comm., NMFS Northwest Region with: (1) K. Wilkinson, NMFS Northwest Region, February 2013; (2) K. Jackson, NMFS Alaska Region, February 2013; (3) P. Cottrell, B.C. Marine Mammal Response Network, Fisheries and Oceans Canada, February 2013.; and S. Wilkinson, NMFS Southwest Region, May 2013.

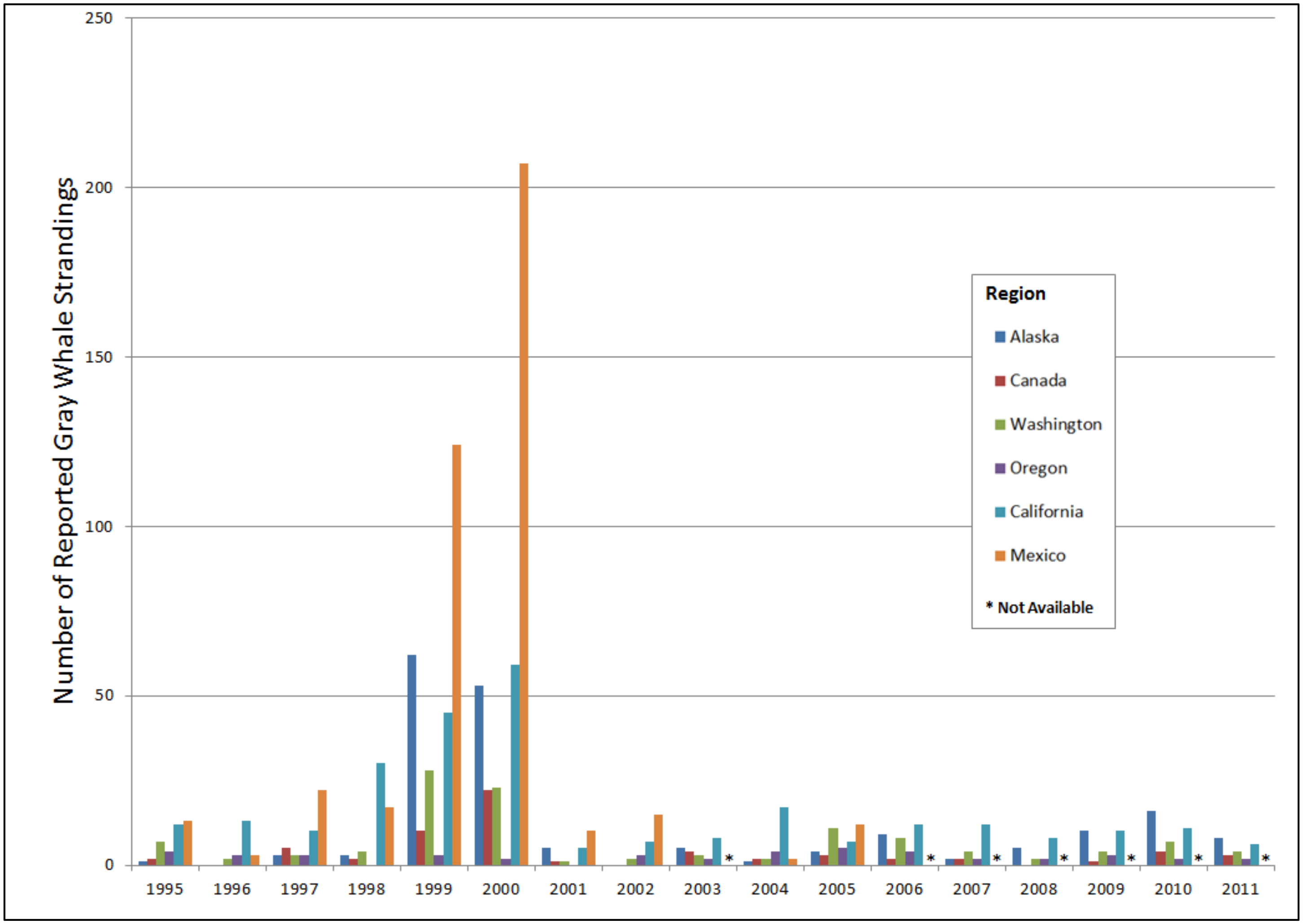

Figure 3-7. ENP gray whale strandings reported from Alaska to Mexico, 1995-2011.

In 1999, the number of gray whale strandings documented along the west coast of North America increased to approximately 7 times the annual mean (41) reported between 1995 and 1998 (Gulland et al. 2005; Figure 3-7). We consulted the Working Group on Marine Mammal Unusual Mortality Events (Working Group) in July 1999 because of the unusually high number of stranded whales (283) in 1999 (Gulland et al. 2005). The Working Group is an advisory board created under section 404 of the MMPA and comprises 12 members with expertise in marine science, including conservation and veterinary science, whose expertise is consulted when marine mammals are dying in an unusual way.

The Working Group weighed the 1999 stranding evidence against the following seven criteria developed to determine whether a stranding event is unusual:

1. A marked increase occurs in the magnitude of strandings when compared with prior records.
2. Animals strand at a time of the year when strandings are unusual.
3. An increase in strandings occurs in a localized area (possibly suggesting a localized problem), occurs throughout the geographical range of the species/population, or spreads geographically with time.
4. The species, age, or sex composition of the stranded animals differs from that of animals that normally strand in the area at that time of the year.
5. Stranded animals exhibit similar or unusual pathologic findings or the general physical condition (e.g., blubber thickness) of stranded animals is different from that normally seen.
6. Mortality accompanies unusual behavior patterns observed among living individuals in the wild, such as occurrence in habitats normally avoided or abnormal patterns of swimming and diving.
7. Critically endangered species are stranding. Stranding of three or four right whales, for example, may be cause for great concern, whereas stranding of a similar number of fin whales may not.

A single criterion or a combination of criteria may indicate the occurrence of an unusual mortality event.

The Working Group concluded that the 1999 stranding event was an unusual mortality event because the animals were stranding throughout their range, stranding rates had increased precipitously, animal behavior and body condition were different from those reported previously (emaciated), and animals were stranding in areas where such events had not been historically noted (behavioral change) (Gulland et al. 2005). The Working Group recommended increasing evaluations and examinations of carcasses, providing a small team to summarize the available information for the Working Group, and coordinating and exchanging information between the four countries in which the gray whale stock occurs (Mexico, the United States, Canada, and Russia) (Gulland et al. 2005).

After the 1999 mortality event was declared unusual, coordination between the stranding networks increased, and two workshops were held in Mexico to enhance coordination (La Paz, March 2000 and Guerrero Negro, March 2001) (Gulland et al. 2005). Stranding detection effort varied significantly, both geographically and temporally. Because of the high stranding report rates, an increased emphasis on timely reporting started in April 1999 and continued through 2002 to allow for real-time analysis of trends (Gulland et al. 2005). We prepared a provisional report for the Working Group in 2000 (Norman et al. 2000), and preliminary findings were presented to the Scientific Committee of the IWC (Pérez-Cortés Moreno et al. 1999). In 2000, the number of stranded animals remained high, with 368 carcasses reported, representing a nine-fold increase from the 1995 to 1998 average (Gulland et al. 2005). At the annual Working Group meeting in March 2001, the Working Group recommended keeping the unusual mortality event open for monitoring, but when only 20 strandings had occurred by October 2001, they recommended closing the event (NMFS 2001b). Based on this information, we closed the event (NMFS 2001b).

We examined and synthesized stranding network information for 1999 and 2000 in Gulland et al. (2005). The authors observed that most of the strandings in 1999 and 2000 occurred in Mexican waters during the winter season. Researchers consistently surveyed stranding effort in the wintering lagoons of Mexico, and the effort in 1999 and 2000 was comparable to that of previous years, except that records of gray whales that stranded outside their normal winter range were obtained opportunistically (Gulland et al. 2005). Increases in all regions, except Oregon, were significant. Fairly consistent stranding detection and reporting in California, Oregon, and Washington (except for remote areas of the Olympic Peninsula) took place from 1995 to 2002. Effort in British Columbia was opportunistic because of the complex coastline. Detection effort and geographic coverage in Alaska differed significantly from year to year, but dedicated surveys were conducted in some areas of the Alaska coast from 1999 to 2001 (Gulland et al. 2005).

Although each stranding was examined as thoroughly as was practical, only 3 (0.5 percent) of the 651 animals that stranded in 1999 and 2000 were examined thoroughly enough to determine the cause of death (including detection of pre-existing conditions). One whale was diagnosed with a viral infection not previously reported in stranded whales (equine encephalitis), one whale had an unusually intense infection of parasites normally associated with baleen whales, and one whale was intoxicated with domoic acid (Subsection 3.4.3.6.3, Harmful Algal Blooms). Researchers considered several factors as possible causes for the high number of gray whale strandings reported in 1999 and 2000. Factors include starvation, chemical contaminants (refer to Subsection 3.4.3.6.2, Environmental Contaminants), biotoxins (refer to Subsection 3.4.3.6.3, Harmful Algal Blooms), disease, parasites, fisheries interactions and ship strikes, variability in detection effort and reporting, and effects of winds and currents on carcass decomposition (Norman et al. 2000; Gulland et al. 2005). The emaciated condition of the stranded whales, combined with evidence of low lipid concentrations and organochlorines in the stranded animals (Krahn et al. 2001) and decreases in calf production in the population during the same time frame (Perryman et al. 2002), led many scientists to conclude that starvation was the most likely cause of mortality. Some of the animals that stranded were in good to fair nutritional condition, suggesting that not all of the strandings link logically to food resource limitation and starvation (Gulland et al. 2005).

The cause of such large-scale starvation remains unknown (Gulland et al. 2005). Some scientists think that the starvation was related to a climatically based decline in prey availability, especially related to the 1997 and 1998 El Niño events in the winter range and the Pacific Decadal Oscillation and Arctic Oscillation in the summer range (LeBouef et al. 2000; Moore et al. 2001; Moore et al. 2003). Perryman et al. (2002) also showed that seasonal changes in ice distribution in the Bering and Chukchi Seas might influence the duration of whale feeding. Because gray whales feed opportunistically on a broad suite of prey species throughout their range and move to alternate areas when the food runs out (Subsection 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem), these explanations seemed simplistic (Nerini 1984; Moore et al. 2001; Moore et al. 2003; Moore 2005; Moore et al. 2007). Others postulated that the starvation related to density-dependent population effects—animals approaching carrying capacity (K) experience heightened competition for food resources and decreased reproductive success. This explanation for the starvation is imperfect, given the suddenness of the demographic change and the relatively larger numbers of adult whales that stranded (Moore et al. 2001). Gulland et al. (2005) suggested that the starvation was probably a result of both density dependence and environmental variability; populations of cetaceans that are at or near K probably are more vulnerable to environmental variability because of nutritional stress.

Weller et al. (2001) reported on the occurrence of unusually “skinny” whales in 1999 and 2000 off Sakhalin Island, Russia, and suspected one or more of the following causal factors: 1) disease, 2) stress-induced metabolic shifts, 3) natural or human-produced changes in prey availability, or 4) habitat perturbation by industrial activities. Bradford et al. (2008) noted that the body condition of gray whales in the WNP varied annually and that, in the short term, these whales seem to recover from periods of compromised body condition; however, the long-term consequences are unknown. A recent assessment by Bradford et al. (2012) revealed that, compared to the reference year of 1997, whales in the WNP were in significantly better body condition in 2004 and in significantly worse body condition in 1999, 2006, and 2007. During surveys along the outer Washington coast, Akmajian et al. (2013) found a high correlation between total number of whales sighted and average body condition as well as evidence that whales in good body condition are more likely to return to the area the following year. Their findings indicate that years with few whales in this portion of the PCFG range may be a result of reduced food availability. These authors also noted that whales in their Washington coast survey area appeared to be in worse body condition more often than whales feeding in the WNP off Sakhalin Island (Bradford et al. 2012, Akmajian et al. 2013).

In 2007, researchers investigating one of the main calving-breeding lagoons in Mexico noted large numbers of whales that were “skinny” in appearance, suggesting malnourishment (Swartz et al. 2007; Urban-Ramirez and Swartz 2007; Urban-Ramirez et al. 2007). Photographic data collected during 2007 in Laguna San Ignacio indicated that 11 to 13 percent of the whales photographed exhibited obvious signs of malnutrition and/or disease, including noticeable depressions in the head region, sub-dermal protrusions of bony parts (e.g., the scapula), and concave rather than convex profiles of whale dorsal flank areas (Swartz et al. 2007). Urban-Ramirez and Swartz (2007) noted other studies where some “skinny” whales that were pregnant returned to their summer feeding areas with apparently healthy calves, suggesting that “skinniness” may not be a fatal condition but instead reflect “a tolerable reduction [in] nutritional resources.” Researchers have continued photographing and monitoring the condition and health of gray whales as part of the Laguna San Ignacio Ecosystem Science Program (Urban-Ramirez et al. 2007; Urban-Ramirez et al. 2010; Swartz et al. 2012; Rosales-Nanduca et al. 2012).

Since the 1999 and 2000 stranding events, stranding levels have returned to the normal range, decreasing to 21 and 26 whales in 2001 and 2002, respectively, and remaining at similar levels since that time (Figure 3-7). Most of the dead whales that biologists examined from 2002 to

2005 died of unknown causes. In a few cases, biologists found evidence of ship strikes (propeller cuts) or entanglement in fishing gear (Gulland et al. 2005).

3.4.3.2 Western North Pacific (WNP) Gray Whales

3.4.3.2.1 WNP Population Structure

Despite the observed mixing of gray whales from the WNP and ENP (see below), the significant mtDNA and nuclear genetic differences between whales feeding in the WNP near Sakhalin Island and those summering in the ENP support the continued recognition of WNP whales as a distinct genetic unit (Lang et al. 2011b). Also, while it is clear that some whales known to feed off Sakhalin Island during the summer/fall migrate to the ENP during the winter/spring, observations of gray whales in the WNP off Japan, Korea, and China during the winter/spring (i.e., when whales #032 and #129 were seen in the ENP) suggest that not all gray whales feeding at Sakhalin Island share a common wintering ground (Weller and Brownell 2012; Weller et al. 2012).

3.4.3.2.2 WNP Seasonal Distribution, Migration and Movements

Gray whales once were extensively distributed from the northern part of the Sea of Okhotsk to the southern tip of the Republic of Korea (Bowen 1974). They were regularly encountered in the far northeastern corner of the Sea of Okhotsk by American whalers in the 1840s to 1870s (Reeves et al. 2008). The present-day range in the WNP is believed to be considerably more restricted (Brownell et al. 2010); key summer feeding grounds include areas off northeastern Sakhalin Island and southeastern Kamchatka Peninsula, Russia (Weller et al. 2002; Weller and Brownell 2012; Tyurneva et al. 2010, 2013). In these areas, gray whales have only been observed feeding on benthic prey (especially amphipods); however, there is also speculation that they may occasionally feed on sandlance in the vicinity of Piltun Lagoon (Fadeev 2011; Vladimirov et al. 2012). Other summer feeding grounds may include areas near the Kurile and Commander Islands, off the mainland coast of Kamchatka, and in the northern Sea of Okhotsk (Brownell et al. 2010).

Little is known about the migratory routes and wintering areas of WNP gray whales, but historic evidence indicates that the coastal waters of eastern Russia, the Korean Peninsula, and Japan were part of the migratory route and that areas in the South China Sea (possibly near Hainan Island, China) and Seto Inland Sea (Japan) were used as wintering or calving grounds (Omura 1984; Weller et al. 2002; Brownell et al. 2010; Weller et al. 2012). Omura (1984) suggested that two populations of WNP whales may once have migrated to coastal waters off Japan. One population was thought to travel along the eastern (Pacific) shore of Honshu during its southbound migration to a possible calving ground in the Seto Inland Sea (Omura 1984). The other was believed to migrate along the eastern shore of Korea then across the Korea Strait to southwest Honshu and northwest Kyushu (Omura 1984). Weller et al. (2002) noted that the current WNP north-south migratory route likely includes regions off the eastern shore of Sakhalin Island in the Okhotsk Sea and along the eastern shores of mainland Russia near Peter the Great Bay and along the Korean peninsula in the Sea of Japan (Andrews 1914; Brownell and Chun 1977; Berzin 1990). However, given the absence of gray whales off the coast of Korea in recent times (i.e., since 1977), Weller and Brownell (2012) suggested that WNP gray whales have abandoned the migration corridor along the Korean Peninsula or that the gray whale subpopulation using the Korean Peninsula is extinct.

Whales associated with the Sakhalin feeding area can be absent for all or part of a given feeding season (Bradford et al. 2008), indicating they use other areas during the summer and fall feeding period. Some of the whales identified and feeding in the coastal waters off Sakhalin, including reproductive females and calves, have also been documented off the southern and eastern coast of Kamchatka (Tyurneva et al. 2010). Whales observed off Sakhalin have also been sighted off the northern Kuril Islands in the eastern Okhotsk Sea and Bering Island in the western Bering Sea (Weller et al. 2013).

Recently, researchers conducting genetic, photo-identification, and tagging studies have discovered 27 cases of whales identified from the WNP also occurring in the ENP. This represents a significant proportion—approximately 19 percent—of the entire population of known WNP whales (Cooke et al. 2013). Lang et al. (2010) reported that two adult whales from the WNP, sampled off Sakhalin (Russia) in 1998 and 2004, matched the microsatellite genotypes, mtDNA haplotypes, and sexes (one male, one female) of two whales sampled off Santa Barbara, California in March 1995. Using photo-identification, researchers have re-sighted whales (including a few known reproductive females) from Sakhalin in the vicinity of Vancouver Island (Canada) and Lagunas Ojo de Liebre and San Ignacio (Mexico) (Weller et al. 2011; Urban et al. 2012). Weller et al. (2012) noted two cases in which multiple whales from the Sakhalin feeding grounds were sighted in the Pacific Northwest, suggesting that these whales may associate with one another even when using migratory routes in the ENP. These researchers also noted that these Sakhalin whales were seen in an area of the ENP (i.e., Vancouver Island) where some whales tend to linger and feed during the northbound migration (Darling et al. 1998). Weller et al. (2012) also speculated that the long distance and potential open water crossing required for transit from the ENP to the WNP may make it advantageous for whales to spend time feeding in the Pacific Northwest prior to undertaking a westerly passage to Sakhalin.

Satellite tagging studies conducted between October 2010 and October 2012 further confirm use of areas in the ENP by whales identified from the WNP (Marine Mammal Institute 2012a[7]; Mate et al. 2011; Joling 2012). Two whales (Russia-U.S. ID #032 and #129) tagged off Russia migrated east across the North Pacific Ocean into areas once believed to be occupied solely by ENP whales.[8] Tags from both whales transmitted data from locations in or adjacent to the coastal portion of the Makah U&A. The 13-year-old male (#032) (first seen as a calf near Sakhalin in 1997) was tagged on October 4, 2010, off Piltun Lagoon, northeastern Sakhalin Island (Mate et al. 2011)[9]. In mid-January 2011 (approximately 4 months after being tagged), he traveled across the Pacific Ocean to the western and central Bering Sea, then proceeded through the eastern Aleutian Islands and across the Gulf of Alaska to areas overlapping with ENP gray whales, heading south 12 to16 miles (approximately 20 to 25 km) off the Washington and Oregon coasts. He was last located by satellite 12 miles (20 km) off Siletz Bay, Oregon, on February 5, 2011, which overlapped with the last few weeks of the usual ENP gray whale southbound migration through this same area (Mate et al. 2011). Although it is not known if the whale eventually traveled farther south that year, researchers noted that they saw him on several occasions while conducting research in the Sea of Okhotsk during the summer of 2012 and that he "appeared to be in good body condition and, while scarred, the tag area [had] healed" (Marine Mammal Institute 2012a).

A second gray whale (#129), was tagged near Sakhalin Island in September 2011; she was an 8.5-year old female at the time of tagging and had been seen intermittently off Sakhalin since first sighted as a calf in 2003 (Marine Mammal Institute 2012a). Like whale #032, she was tracked across the North Pacific Ocean, the Gulf of Alaska, and south along the west coasts of the U.S. and Canada. In contrast, however, whale #129's tag continued to transmit for a much longer

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[7] This research was conducted by A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences (IEE RAS) and Oregon State University Marine Mammal Institute in collaboration with the U.S. National Marine Fisheries Service, Kronotsky State Nature Biosphere Reserve, and the Kamchatka Branch of the Pacific Institute of Geography. The research was contracted through the International Whaling Commission (IWC) and International Union for Conservation of Nature (IUCN) with funding from Exxon Neftegas Ltd. and Sakhalin Energy Investment Company Ltd (Marine Mammal Institute 2012a).

[8] A third gray whale (Russia/U.S. ID #141) was also tagged off Sakhalin and tracked travelling east across the north Pacific before the tag stopped transmitting in early January 2012, approximately two-thirds of the way across the Gulf of Alaska (Joling 2012).

[9] Photo-identification studies reveal that Russia/U.S. ID #032 was also assigned identification number CRC ID #1045 by Cascadia Research Collective. This whale had been sighted off Sakhalin during July-September 2007, off Vancouver Island in April 2008, and then back off Sakhalin in July 2008 (Weller et al. 2012).

period of time (408 days) and revealed that she spent several weeks from late January to early March along the coast of Baja Mexico, in and adjacent to the gray whale calving lagoons. Also, her tag continued to transmit after leaving Mexico, revealing a northbound track that roughly followed the southbound track along the British Columbia, Washington, Oregon, and California coasts. Unlike her southbound migration where the whale transited the Gulf of Alaska, she migrated north along the coast of Alaska, crossing the Aleutian Peninsula and following the sea ice of the North Pacific Ocean and eventually entering nearshore waters off Kamchatka in late April 2012 (Journey North 2012).

Based on transmissions from whale #129 received within and adjacent to the Makah U&A, researchers estimated that the whale traveled through the coastal portion of the Makah U&A southbound January 8 to 15, 2012, and northbound March 11 to 18, 2012 (Journey North 2012; Marine Mammal Institute 2012b). She eventually returned to WNP feeding grounds in the Sea of Okhotsk and the satellite tag stopped transmitting off Sakhalin Island on October 12, 2012 (Journey North 2012; Marine Mammal Institute 2012a).

Based on the best available information regarding movements of whales between the WNP and ENP, including 1) photographic records from Russian, U.S., and Mexican catalogs; 2) satellite telemetry data; and 3) genetic analyses of biopsied whales[10], it is possible to conclude the following:

- Between 1994 and 2012 a high percentage (19 percent) of whales known to forage in the WNP have been re-sighted in the ENP. Sightings include males, females, and females with calves (in Mexico lagoons).
- Sightings of several WNP whales at the same time and location along the ENP migration corridor (and within the PCFG area) indicate that some WNP whales may travel in close proximity to one another.
- The earliest and latest sightings of WNP whales in the ENP (Alaska to Mexico) indicate that such whales could be present in the PCFG range from late December until at least early May.

[10] The genetic matches were obtained by analysing tissue biopsies from whales sampled off Sakhalin and southern California and identifying those that had identical genotypes (Lang et al. 2011a). While comparison of photographs and/or genetic profiles can be used to determine if a whale has visited the WNP and the ENP, presently it is not possible to use genetic analyses alone to determine which of the animals feeding off Sakhalin remain in the WNP year-round.

- The lack of WNP whale sightings between early May and late December (Weller et al. 2012; IWC 2014c)—a period including the most active gray whale survey months within and adjacent to the Makah U&A (Calambokidis et al. 2014)—indicate it is unlikely these whales would be encountered by Makah hunters during this timeframe.

3.4.3.2.3 WNP Abundance and Trends

The assessments by Yablokov and Bogoslovskaya (1984) and Berzin and Vladimirov (1981) suggest that as many as 10,000 WNP gray whales (pre-exploitation) may have dwindled to as few as 1,000 animals by 1910. By the 1970s, the population was considered extinct because it either was extinct or so low in abundance that whales were not observed (Bowen 1974). The most recent population assessment of WNP gray whales (Cooke et al. 2013) estimates that there are approximately 140 individuals (excluding calves) in this stock (with a 95 percent confidence interval of 134 to 146 animals). This assessment also reported that the average annual rate of increase was 3.3 percent over the last 10 years (2002 to 2012).

3.4.3.2.4 WNP Status, Carrying Capacity, and Related Estimates

WNP whales were thought to be extinct as recently as the 1970s (Bowen 1974); however, more recent reports and research efforts indicate that a relic WNP population still exists, though it is quite small (Weller and Brownell 2012; Cooke et al. 2013). Alter et al. (2007) used estimates of genetic diversity to infer that North Pacific gray whales (both WNP and ENP stocks) may have numbered approximately 96,000 animals over 1,000 years ago, but did not assign a proportion of that number to either stock. Similarly, it is difficult to determine the accuracy of Yablokov and Bogoslovskaya's (1984) pre-exploitation estimate of as many as 10,000 WNP whales (Weller et al. 2002).

The WNP stock is currently listed as endangered under the U.S. Endangered Species Act and depleted under the MMPA. In response to a NMFS Task Force recommendation (Weller et al. 2013)[11], NMFS released a draft stock assessment report for the Western North Pacific stock of gray whales in January 2015 (Carretta et al. 2015). As noted in the subsection above, the current population estimate for this stock is 140 non-calf animals, while the minimum population estimate is 135 animals. The stock assessment report does not address the carrying capacity for

[11] The recommendation was made in light of the MMPA's requirement that SARs be published for all stocks of marine mammals in U.S. waters in combination with the recent evidence that some whales identified in the WNP have been observed to migrate through U.S. waters to Mexico.

this stock, but the analysis by Moore and Weller (2013) results in PBR values ranging from 0.07 whales (using a recovery factor of 0.1) to 0.33 whales (using a recovery factor of 0.5), with uncertainty in these values being driven by uncertainty in the fraction of WNP animals migrating in ENP areas.

The IWC has not established a catch limit for WNP gray whales. In 2011, the IWC's Scientific Committee reviewed the analytical framework and management advice supporting the allocation of gray whale catch limits to aboriginal hunters (IWC 2012b). The Committee noted that the existing framework was designed to evaluate ENP gray whales, but does not incorporate conservation considerations for WNP whales. The Committee recommended additional research on WNP gray whales (especially genetic, photo-identification, and telemetry/tracking studies) and an analysis estimating the probability of a WNP gray whale being taken in aboriginal hunts for ENP whales. As noted in Subsection 3.4.3.1.2, Global Distribution and Population Structure, the IWC Scientific Committee is actively reviewing the status (including stock structure and movements) of all North Pacific gray whales, including those in the WNP.

The limited sighting data available on WNP migrations and movements suggest that it is most likely that whales from this stock could be encountered in the vicinity of the Makah U&A during the hunting season proposed by the Tribe, perhaps with the exception of early May to late December. Because of concerns about the precarious status of the WNP stock and in response to the Committee's recommendation above, Moore and Weller (2013) recently employed several models to assess the likelihood of a WNP whale being struck in a Makah hunt. Using the model considered most plausible (i.e., it had the fewest assumptions and used all datasets) and taking into account the Tribe's hunt proposal, they estimated[12] that the Tribe might strike a whale approximately once every 100 years. There was a high probability that during a 6-year period a WNP whale would be pursued or approached by Makah hunters (i.e., a probability of 0.98 to approximately 1.0, depending on the number of whales approached and whether the median or upper 95th percentile estimate is used). The probability of an attempted strike on at least one WNP whale in 6 years was still fairly high (i.e., 0.35 to 0.74). The probability of actually striking at least one WNP whale in 6 years was relatively low but non-trivial (i.e., 0.07 to 0.20). The loss of a single whale, particularly if it were a reproductive female, would be a conservation concern

[12] During the development of this draft EIS, these authors updated their analysis to take into account modified assumptions/data values regarding hunt duration and the number of approaches, strikes, and attempted strikes. The numbers reported here rely on the same model but reflect the updated data (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014).

for this small stock. The IWC and a series of independent expert panels established by the IUCN have emphasized the urgent need for a comprehensive international strategy to eliminate or mitigate anthropogenic threats facing WNP gray whales throughout their range. The international Western Gray Whale Rangewide Workshop, convened by IUCN in Tokyo in 2008, summarized the state of knowledge regarding the population, identified information gaps, specified and ranked threats, and mapped out needed research and management actions. Its primary recommendation was to develop and implement a conservation plan for WNP gray whales, a draft of which was developed in August 2010 (Brownell et al. 2010) and the subject of a recent memorandum of cooperation signed by the U.S., the Russian Federation, and Japan (Memorandum of Cooperation 2014).

3.4.3.3 Eastern North Pacific (ENP) Gray Whales

3.4.3.3.1 ENP Population Structure

As noted previously, ENP gray whales are managed as a single stock by NMFS (Carretta et al. 2014) and the IWC (2012b), and are recognized as a separate subpopulation by the IUCN (Reilly et al. 2008) (see also Subsection 3.4.3.2.2, WNP Population Structure). There has been longstanding recognition that ENP and WNP gray whales are separate stocks (Rice and Wolman 1971), and genetic studies support this distinction (LeDuc et al. 2002; Lang et al. 2010; Lang et al. 2011a; Meschersky et al. 2012). There is also some speculation that recently detected mixing between the WNP and ENP (refer to Subsection 3.4.3.2.1, WNP Seasonal Distribution, Migration, and Movements) signifies a lack of gray whale population structure (Bickham et al. 2013). There is also emerging evidence from a variety of sources (genetic, photographic, and telemetric) indicating possible substructure within the ENP population, in particular the possible existence of a PCFG stock of gray whales (Frasier et al. 2011; IWC 2011a; Lang et al. 2011b; Weller et al. 2013). Subsection 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales discusses this evidence in detail.

Alter et al. (2012) investigated the pre-whaling diversity, population dynamics, and feeding ecology of gray whales using genetic and isotope analyses to compare modern gray whale samples to those from 150 to 3,500-year-old gray whale bones excavated from archaeological sites on and near the Makah reservation. Overall, their genetic analysis supported the hypothesis that gray whales experienced a recent major population decline. Results from their isotope analysis showed very slight differences between ancient and modern whale samples, suggesting the possibility of population substructure in the past in the vicinity of the Olympic Peninsula and Vancouver Island.

Genetic studies also suggest some substructuring may occur on the wintering grounds, with significant differences in mtDNA found between females (mothers with calves) using two of the primary calving lagoons and females sampled in other areas (Goerlitz et al. 2003). Other research, employing both mtDNA and microsatellites, identified significant departure from panmixia (random mating) between two of the lagoons using nuclear data, although no significant differences using mtDNA were observed (Alter et al. 2009).

In April 2014, the IWC held a workshop to conduct a rangewide review of the population structure and status of North Pacific gray whales (IWC 2014c). Workshop participants explored the most recent data and analyses available regarding gray whale movements and stock structure (including several stock structure hypotheses, removal data, abundance and trends, population parameters, and human activities that may affect gray whale status (refer to Subsection 3.4.3.1.2, Global Distribution and Population Structure). A major thrust of the workshop was to begin development of a modelling framework to better assess the status of gray whales and the potential impact of human activities and possible changes in regime or climate. The IWC Scientific Committee plans to convene a second workshop in 2015 to review the results of the initial modelling effort.

Sex Ratio of ENP Whales

Lang et al. (2010) conducted genetic analyses on dozens of gray whale samples from the ENP, including whales from off Chukotka and from the PCFG. Females made up 59 to 60 percent of the whales sampled from the northern stratum (collected from whales north of the Aleutians). This same level of female bias was also found in the samples taken from off Chukotka and from the PCFG.

3.4.3.3.2 ENP Seasonal Distribution, Migration, and Movements

ENP gray whales generally migrate seasonally along the coast of North America between a summer range as far north as the Bering, Chukchi, and Beaufort Seas and a winter range as far south as the Baja California Peninsula and Gulf of California in northwestern Mexico (Rice et al. 1984; Urbán-Ramírez et al. 2003) (Figure 3-3). The general characteristics, timing, and migratory distance relative to shore for fall/winter southward and spring northward migrations are described more specifically below. In addition, while most ENP whales migrate north of the Aleutian Islands/Alaska Peninsula, a small number of whales remain south of the Alaska Peninsula to feed. The IWC refers to the southern assemblage of ENP whales observed between June 1 and November 30 from 41°N to 52°N in 2 or more years as the “Pacific Coast Feeding Group” (PCFG) (IWC 2012a). In addition to these PCFG whales, there are also ‘straggler’ or ‘transient’ gray whales (IWC 2012e; Calambokidis et al. 2014) that have only been seen feeding in the PCFG area in a single year (presumably using northern feeding grounds in other years). This EIS discusses whales seen in the PCFG area separately in Subsection 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales. The remainder of this subsection focuses on the larger group of ENP whales that migrate to summer/fall feeding areas north of areas used by the PCFG (i.e., north of 52°N, roughly northern Vancouver Island).

Summer/Fall Foraging

The bulk of the ENP population forages in a summer/fall range north of the Aleutian Islands in areas commonly referred to in the literature as the northern seas (Nerini 1984; Gardner and Chávez-Rosales 2000) and primary, principal, traditional, northern, or summer feeding grounds (e.g., Braham 1984; Nerini 1984; Swartz 1986; Darling et al. 1998; Moore et al. 2000; Dunham and Duffus 2002; Findlay and Vidal 2002). In addition, sizeable aggregations of gray whales (up to 400 animals) have been reported during the late spring and summer off southeast Alaska, especially near Kodiak Island (Moore et al. 2007; Gosho et al. 2011). These sightings are north of the PCFG's defined range and south of the primary summer range used by most ENP whales. Little is known about these southeast Alaska whales except that there appears to be some consistency in their occurrence and some have been sighted further south in the PCFG area (Moore et al. 2007; Gosho et al. 2011). The discussion that follows focuses on the northern foraging areas used by the vast majority of the ENP population.

The bulk of the ENP herd usually arrives in the Bering Strait by the end of May (Yablokov and Bogoslovskaya 1984). Hessing (1981) observed approximately 4,000 gray whales transiting the Aleutian Islands via Unimak Pass from May through mid-June (peaking on June 4), and Barrett-Lennard et al. (2011) reported sightings in this area during the month of May. The extent of ENP gray whale distribution and habitat use in the summer range is not well documented, and patterns are difficult to discern; much of the data come from historical whaling records or observational efforts that are not consistent or comparable (Berzin 1984; Clarke and Moore 2002). Sighting data from Soviets and Americans throughout 1958 to 1993 are summarized in Clarke and Moore (2002), but the information is of limited value because of the inconsistent methods by which the data were collected. Generally speaking, whales are distributed as far east as the Canadian Beaufort Sea (Rugh and Fraker 1981), as far west as the Eastern Siberian Sea along the coastal shelf of Siberia and near Wrangel Island (Berzin 1984; Reilly 1984; Miller et al. 1985; IWC 2006), along the north and south coasts of the Chukotkan Peninsula (Berzin 1984; Miller et al. 1985), at shoals in the northeastern Chukchi Sea near Barrow, Alaska (Moore et al. 2000), and in the northern Bering and southern Chukchi Seas in areas between the Bering Strait and St. Lawrence Island (Moore et al. 2003).

Sea ice cover influences gray whale distribution, especially during long periods of time, such as glacial advances during the Pleistocene, when global climate change likely eliminated major feeding areas (Pyenson and Lindberg 2011). However, the primary factor influencing distribution and habitat selection appears to be availability of prey (Moore 2000; Clarke and Moore 2002). During the summer months in the Alaska Beaufort Sea (i.e., western Beaufort Sea) and southern Chukchi Sea, gray whales selected coastal and shoal habitats (less than 115 feet [35 m] deep) with less than 20 percent ice cover (Moore et al. 2000). Scientists at the 2006 IWC meeting reported that six satellite-tagged individual whales were also monitored moving north to these regions in open ice leads (i.e., open water paths in the ice) during mid-June, but they moved through areas that had 30 to 40 percent ice cover at times (IWC 2006). In the fall months, whales have been observed feeding in more than 70 percent ice cover. Moore et al. (2000) concluded that gray whale habitat selection is not strongly related to ice conditions (ratios for numbers of whales at various depths were similar for both light and heavy ice years); instead, gray whale distribution is primarily linked to prey density. During years when strong surface winds result in the cross-shelf transport of upwelled, nutrient-rich waters, benthic prey species are probably more productive and densely aggregated in nearshore coastal and shoal habitats (Moore 2000). During years of moderate to low wind mixing and transport, gray whales select shelf and trough habitats further offshore, where currents are directed by bathymetric features (i.e., seafloor geology) and may provide migration cues to southbound whales (Moore et al. 2000). Recently Perryman et al. (2011) observed that ice cover has not decreased consistently across seasons and that during the past 30 years the earliest northbound migrants (pregnant females) are encountering ice distributions that have changed relatively little during that period.

The overall abundance of the gray whale population also probably influences distribution in the northern portion of the summer range (and elsewhere) because, as the gray whale population increases, the range may expand as individuals forage more widely for limited food resources (Moore et al. 2007). Rugh et al. (2001) proposed that the week’s delay in southward migration timing after 1980 may have been due to a wider distribution of the population as their search for food covered increasingly greater areas, making the trip south longer. This effect of a larger population leading to a wider dispersal was also noted by other authors (Yablokov and Bogoslovskaya 1984; Stoker 2001).

Within-season movement of gray whales has been documented over the years, leading researchers to the conclusion that whales in the northern portion of the summer range exhibit constant and extensive local migrations between feeding areas; they do not stay in one area for the entire season (Yablokov and Bogoslovskaya 1984; IWC 2006). Individual whale movement in the northern portion of the summer range has not been documented to the extent of individual whales in the southern portion of the summer range (photographic-identification is impractical in such a large and remote area), but scientists at the 2006 IWC meeting reported preliminary results from a recent satellite-tagging study. The tagging data show that four individual whales used the southern Chukchi Sea for more than 3 months, with the distribution of the individual whales overlapping by only 3 percent within this area (IWC 2006). In concluding its recent Implementation Review of gray whales, the Scientific Committee of the IWC noted that further work should be undertaken to investigate the possibility of population structure on the northern feeding grounds, especially in the region of the Chukotkan hunts (IWC 2011a). To that end, the Scientific Committee of the IWC recently held the first of at least two workshops to explore the most recent data and analyses available regarding North Pacific gray whale movements and stock structure (IWC 2014c; refer to Subsection 3.4.3.1.2, Global Distribution and Population Structure).

Long-term shifts in the summer range have also been described recently and are thought to be related to the operation of two major oceanic climate cycles: the Arctic Oscillation and the Pacific Decadal Oscillation. These two cycles generally occur in the North Pacific every 10 to 30 years, last 30 to 40 years, and have distinct warm and cool phases caused by changes in sea surface pressure and sea surface temperature. The operation of both the Arctic Oscillation and Pacific Decadal Oscillation appears to be causing a major ecosystem shift in the Bering Sea, a transitional area that is at a crossroads between the Pacific Ocean and the Arctic Ocean and is, therefore, influenced by both cycles (Bond 2006; Grebmeier et al. 2006).

The Bering Sea (northern Bering and southern Chukchi Sea) was once considered the primary gray whale feeding ground (Braham 1984; Moore et al. 1986; Kim and Oliver 1989; Moore et al. 2000). During the late 1970s to early 1980s, it was characterized by cold climate conditions with extensive seasonal ice cover and high benthic productivity (Grebmeier et al. 2006). Time-series studies from the Chirikov Basin (between St. Lawrence Island and the Bering Strait) show that in 1980, *Ampeliscid* amphipods were the primary prey items of gray whales, sampled at record-high densities from the 1970s to mid-1980s (Stoker 1981; Yabolokov and Bogoslovskaya 1984; Grebmeier et al. 1989; Highsmith and Coyle 1990). The amphipod prey base declined by

30 percent between 1986 and 1988 (Highsmith and Coyle 1992; Sirenko and Koltun 1992). This reported decline in benthic biomass did not have an immediate observable effect on gray whale abundance. A subsequent gray whale mortality event in 1999/2000, coupled with observations of emaciated whales, led scientists to conduct aerial surveys of the Chirikov Basin in 2002 to compare distribution and relative abundance with the 1980s data (Moore et al. 2003). Sighting rates of gray whales in the Chirikov Basin were 3 to 17 times lower than they had been in the 1980s (Moore et al. 2003; Grebmeier et al. 2006). Benthic productivity of the prey base had declined precipitously, and only the southern Chukchi Sea supported dense aggregations of whales (Moore et al. 2007).

The Bering Sea is now characterized by warmer conditions with less sea ice cover and lower benthic productivity than in the 1970s (Grebmeier et al. 2006). Gray whales have responded by foraging in other areas (Moore et al. 2003; Moore 2005; Moore et al. 2007). Observers are now seeing larger feeding aggregations in different parts of the northern portion of the summer range, north of the Bering Strait in the south-central Chukchi Sea and just north of St. Lawrence Island in the northern Bering Sea (south of the Chirikov Basin), an area that was previously recorded as devoid of gray whale feeding (Clarke and Moore 2002; Moore et al. 2003). Scientists reported at the 2006 IWC Scientific Committee meeting that a large proportion of 17 satellite-tagged whales fed extensively in the Chukchi Sea; six whales retained their tags for more than 100 days, and all six spent most of their time in the Chukchi Sea (IWC 2006). Stafford et al. (2007) noted that gray whales were once rare visitors to the Beaufort Sea, but their numbers have been increasing since the mid-1990s. In 2003/2004, these researchers deployed acoustic recorders in the Beaufort Sea and unexpectedly detected gray whale calls throughout the winter near Barrow, Alaska. Additional analysis revealed that there was sufficient ice-free space for gray whales to surface and breathe, so it is unlikely that calls came from animals that were entrapped in the ice (Stafford et al. 2007). These studies support the possibility that gray whales are altering their foraging habits in the Arctic. Observers have also documented feeding that has not been seen previously in the southern portion of the summer range, such as near Kodiak Island and in the Gulf of Alaska (near Sitka) (Moore et al. 2003, 2007; Gosho et al. 2011).

Fall/Winter Southward Migration

The onset of the southward migration is difficult to define (Rugh et al. 2001) and is typically associated with the primary breeding period. Timing may be influenced by several environmental variables, including the extent of ice coverage, availability of food resources, and photoperiod (Rugh et al. 2001; Clarke and Moore 2002; Swartz et al. 2006). It is also related to how widely the whales are distributed for foraging (Rugh et al. 2001). Most whales migrate out of northern seas sometime around mid-October to November, but some have been seen swimming south near Point Barrow as early as mid-August, and some have been seen along the Chukotkan Peninsula as late as mid-December (Rugh et al. 2001). The southward migration is generally grouped into two phases by age, sex, and reproductive status (Rice and Wolman 1971). The first migrant phase consists of near-term pregnant females, followed by non-pregnant females and mature males. The second migrant phase consists of immature whales of both sexes (Swartz et al. 2000; Swartz et al. 2006). Poor weather conditions and widely scattered offshore distribution of gray whales make it difficult to survey whales migrating through the area (Green et al. 1995; Shelden et al. 2000; Rugh et al. 2001), but some studies are available. Shelden et al. (2000) reported observations of gray whales off the coast of Washington and in the Strait of Juan de Fuca near Port Angeles in early to mid-November. Observational studies also support the presence of southbound gray whales off the coast of Washington in December (Pike 1962; Darling 1984; Shelden et al. 2000; Calambokidis et al. 2009a) and January (Calambokidis et al. 2009a). Using data from surveys at other locations, along with measured travel speeds of migrating gray whales, Rugh et al. (2001) calculated January 5 as the peak of the southward migration past Tatoosh Island.

The most routine observations of the gray whale migration have been in California (Rugh et al. 2001). Data from shore-based stations have shown a 1-week shift in timing of median dates of southbound migrants (from January 8 to January 16) after 1980. This might have been due to an oceanographic regime shift in the northern portion of the summer range. The shift caused extreme ice retreats and may have expanded the distribution of gray whales on the feeding grounds and increased the distance of the southward migration (Miller et al. 1994; Hare and Mantua 2000; Rugh et al. 2001; Moore et al. 2003; Shelden et al. 2004; Moore 2005). Concurrent with these findings, southbound calf sightings have increased near San Diego (southern California) and Carmel (central California) since 1980; the 1-week delay in the southward migration has meant that calving has occurred farther north than the Baja lagoons during the southward migration (Shelden et al. 2004). Gray whales generally reach these wintering grounds starting in late December or early January and reach maximum densities in February. There is also recent evidence that not all gray whales migrate south for the winter. Mate et al. (2010) satellite tagged a whale that remained off the northern California and southern Oregon coasts throughout the winter.

Winter Breeding and Calving

Gray whales occupy a large winter range, extending along the west coast as far north as Point Conception and the Channel Islands in central California (near Santa Barbara) and south to Cabo San Lucas (Reilly 1984; Jones and Swartz 2002; Urbán-Ramírez et al. 2003), where most investigators have concentrated their observations (Findlay and Vidal 2002). Findlay and Vidal (2002) also reported that some of the population migrates farther south, around the tip of the peninsula and into the Gulf of California. A few isolated sightings of gray whales over the years have also occurred in more southern localities along the Pacific coast of mainland Mexico and at the oceanic Revillagigedo Islands (Findlay and Vidal 2002). In contrast, there is evidence that some whales do not migrate as far south as Mexico (Herzig and Mate 1984; Swartz 1986; Swartz et al. 2006), and Shelden et al. (2004) hypothesized that females that give birth north of Mexico may instead congregate near California's Channel Islands until their calves are large enough to migrate north.

As in the summer range, gray whales in the winter range often aggregate in specific areas of the ocean, particularly near and within coastal lagoons and bays of Baja, including Lagunas Guerrero Negro, Ojo de Liebre (Scammon's Lagoon), San Ignacio, Bahia Magdalena, Bahia Almejas, and Santo Domingo Channel (Urbán-Ramírez et al. 2003). The whales segregate spatially and temporally, such that their distribution, gross movements, and timetable of lagoon occupation differ for each age-sex group (Jones and Swartz 1984; Urbán-Ramírez et al. 2003; Swartz et al. 2006). Females with calves concentrate within the interiors of lagoons or lagoon nurseries and shift to the lagoon inlets and coastal waters occupied by the single whales without calves (i.e., oestrus females and mature males) when those whales depart for the northward migration (Jones and Swartz 1984; Swartz et al. 2006). Although there is repeated use of some lagoons, whales move among and between lagoons and spend some amount of the winter in waters outside of lagoons (Urbán-Ramírez et al. 2003). Recent surveys indicate that more females are using Laguna San Ignacio as a winter aggregation area and that cow-calf pairs from other such areas are moving into this lagoon late in the winter breeding season, a pattern last seen in the late 70s and early 80s (Swartz et al. 2012).

The aggregating behavior of the whales and their within-season movement between different areas on the wintering grounds relate to both reproductive and feeding activities, although some literature reports that whales mostly fast throughout the winter and rely on reserves of body fat to carry them through the winter period. Most of the feeding in the wintering grounds appears to be pelagic, rather than benthic, although researchers have seen mud plumes indicative of benthic feeding (Nerini 1984). Pelagic prey species include sardines, bait fish, spawning squid, and crustaceans associated with eel grass mats (Nerini 1984). Feeding areas that foraging gray whales frequent, as documented by Nerini (1984), include San Ignacio Lagoon, Magdalena Bay, Punta San Juanico, and Laguna de San Quentin in Baja Mexico, and La Jolla and Point Loma, California.

On a longer-term basis, evidence indicates that distribution and habitat use within the wintering range varies according to environmental conditions. As one example, Bryant et al. (1984) observed that whales apparently deserted the Laguna Guerrero Negro, the northernmost lagoon, during the late 1960s but reestablished during the 1970s, increasing steadily until an observed decline in 1982. They postulated that the whales recolonized the area after commercial shipping and dredging activities stopped in 1967, but they also noted that year-to-year fluctuations in relative abundance had previously been reported and observed that some individual whales enter lagoons in successive years whereas others return after longer intervals.

Recent studies have attributed shifts in the winter range to the El Niño Southern Oscillation, a multi-year climatic cycle occurring irregularly in the tropical Pacific every 2 to 7 years and lasting 6 to 18 months. When El Niño events occur, driven by low atmospheric pressure between Tahiti and Australia, sea surface temperatures warm and biological productivity drops near Baja. Whales shift farther north in their distribution, such as during the 1998 wintering season. When El Niños subside (and La Niñas occur), the sea surface temperatures are cooler near Baja (e.g., the 1989 and 1999 calving seasons), the biological productivity is higher, and whales shift south in their distribution (Gardner and Chávez-Rosales 2000; Sánchez-Pacheco et al. 2001; Urbán-Ramírez et al. 2003; Swartz et al. 2012). The observation of this shift led Gardner and Chávez-Rosales (2000) to conclude that environmental conditions may be more important factors in determining breeding locations than site fidelity.

Spring Northward Migration

In mid-February, as the southward migration comes to an end in California and Mexico, the northward migration begins. This overlap suggests that not all of the gray whale population winters near the Baja California Peninsula. Some whales may only go as far south as the coastal waters of California before they turn around to head north (Herzig and Mate 1984; Swartz 1986; Swartz et al. 2006; Mate et al. 2010). The northward migration to summer feeding areas occurs in two generally grouped phases according to age, sex, and reproductive condition (Poole 1984; Swartz 1986; Swartz et al. 2006). The first migrating phase consists of newly pregnant females, followed 2 weeks later by adult males and non-pregnant females, then by immature whales of both sexes another week later (Swartz et al. 2006). In mid- and late February, as the first phase of the migration is underway, mothers with newborn calves move from interior lagoons to lagoon inlets and coastal waters previously occupied by the single whales (Swartz et al. 2006). These mother and calf pairs compose the second migrating phase of whales and are the last to leave the wintering areas, departing between late March and May and generally arriving in their summer feeding range from May to June (Swartz et al. 2000; Swartz et al. 2006).

Poole (1984) reported the first phase of northbound migrants off the coast of central California from early February to early April. Gilmore (1960) reported similar dates (mid-February, peaking in March and April, and tapering off in early May) as whales pass San Diego. Herzig and Mate (1984) reported the first phase of northbound migrants passing through the waters off Oregon in mid-February through April, peaking in mid-March. Wilke and Fiscus (1961) observed over 200 gray whales (singles, pairs, and groups of 3 to 4 animals) off the central Washington coast on April 24 and 25, 1959. Similarly, Calambokidis et al. (2009a) sighted northbound gray whales along the central Washington coast (offshore of Grays Harbor) during February, March, and April. A study conducted at Unimak Pass, Alaska, reported a peak passage of northbound phase-one migrants in the last week of April, indicating an approximate lag of 4 to 5 weeks between Oregon and Alaska (Hessing 1981; Herzig and Mate 1984).

The cow-calf migrants in the second migrating phase travel more slowly than the whales in the first migrating phase to accommodate nursing and calves (NMFS 2001a), and they have been reported to follow the first phase by 7 to 9 weeks (Herzig and Mate 1984). The predominantly cow-calf pair migrants in the second phase of the northward migration have been sighted passing through the waters off central California from early April to late May (Poole 1984; Perryman et al. 2011) and passing by Oregon from late April to May, peaking in mid-May (Herzig and Mate 1984). During the Tribe's 2000 hunt in coastal waters of their U&A, Gearin and Gosho (2000) noted that most of the whales observed during the hunt (April 17 to May 29) were large individual whales and not pairs. Whales observed in the vicinity of the hunt did not appear to be milling or feeding but instead exhibited migratory behavior in terms of their dive duration and movements. Further north, Hessing (1981) observed cow and calf pairs passing Unimak Pass, Alaska, from May through mid-June, peaking on June 4.

Taking both migration phases into account, northbound whales of all ages and both sexes are present off the Washington coast from late February through June. There are no direct observations that establish the timing of either phase of the northward gray whale migration through the project area, nor are there any published estimates based on observations from other areas (as Rugh et al. [2001] calculated for the southward migration). Given the available observational data, it is reasonable to estimate that migrants in the first phase of the northward migration would be in the project area from March through early May, and migrants in the second phase would be in the project area from roughly early May until June.

Migratory Distribution Relative to Shore

The migratory distribution of gray whales relative to shore (i.e., location, width, and extent of the migratory corridor) varies based on environmental conditions (such as bottom topography, climate, and water depth), migration season and phase, and use of the migratory corridor (such as feeding, breeding, or migrating). Generally, gray whales migrate closer to shore where the continental shelf is narrow, such as near Granite Canyon, California, and distribute farther offshore where the continental shelf is broader, such as near the Channel Islands, California (Shelden et al. 2004). There is also evidence that northbound whales travel closer to shore during spring than do southbound whales in fall and winter (Herzig and Mate 1984; Green et al. 1995; Calambokidis et al. 2009a). During the 1999 and 2000 Makah hunts (in April and May), gray whales were sighted or pursued an average of 1.0 mile (1.6 km) from shore (Gosho 1999; Gearin and Gosho 2000).

Off the coast of Oregon, where the continental shelf is relatively narrow, Herzig and Mate (1984) systematically documented the offshore distribution of both northward and southward migrations, including both phases of migrants, from November to May, 1978 to 1981. They determined that more than 50 percent of all whales in the first phase of the southward and northward migration passed between 1 and 2 miles (1.6 and 3.2 km) from shore, 131 to 197 feet (40 to 60 meters) deep. They also estimated that 90 percent of the second phase of northbound migrants, consisting predominantly of cow-calf pairs, passed less than 2,625 feet (800 m) from shore. Herzig and Mate (1984) noted that, as the northward migration progressed, pod size decreased and whales moved progressively closer to shore, traveling within 1 mile (1.6 km) from shore. Green et al. (1992) evaluated sightings data relative to depth and distance to shore and concluded that the gray whale migration corridor does change in concert with varying depths (i.e., whales were found greater distances offshore when shallow depths extend further offshore).

These nearshore patterns of migration for northbound whales are consistent with observations made off the coast of California from 1980 to 1982 (Poole 1984). Poole (1984) determined that the first phase of northbound migrants moved slightly farther offshore than the second phase; the first phase traveled within a straight-line corridor from one major point of land to another to avoid bights in the coastline, while the second phase (consisting of 90 percent cow-calf pairs) hugged the contours of the coastline. Sixty percent of the first phase of northbound migrants passed between 2 miles and 0.5 mile from shore (between 3.2 km and 800 m), 20 percent between 0.5 mile and 0.1 mile from shore (between 800 m and 200 m), and 13 percent within 0.1 mile (200 m) of shore. Ninety-nine percent of the second phase of northbound migrants passed within 0.1 mile of shore in 1980, and 96 percent passed within that distance in 1981. Poole (1984) and Braham (1984) noted potential biological advantages of nearshore migration, including the availability of productive food sources in shallow nearshore waters (such as eel grass meadows and swarms of mysid shrimp in kelp beds) and protective cover from predators provided by nearshore rocks, bottom topography, and kelp beds.

Further north, Green et al. (1992) conducted aerial surveys between April 1989 and September 1990[13] during which they sighted 57 gray whales (51 groups) off Washington and 225 gray whales (150 groups) off Oregon. All of the migrating whales observed off Washington were found greater than 3 miles (5 km) offshore, with a mean distance offshore for all southbound whales (Oregon and Washington) of 8.9 miles (14.3 km) compared to 5.0 miles (8.0 km) for northbound whales. At least two of the sightings occurred in the project area.

Pike (1962) used logbooks from the M/V *Pacific Ocean*, a fur seal research vessel operating during March to May of 1958 to 1960, to document gray whale northward migrations off the coast of Washington. Pike (1962) reported that most whales probably passed within 1.2 miles (1.9 km) of the coast during the spring northward migrations, noting that "many whales pass by close to shore where their presence is difficult to detect against the surf breaking along the rocky coast and boiling over Umatilla reef." These observations are similar to the results of Herzig and Mate (1984) and Poole (1984). Pike (1962) also described northbound whales farther offshore. Logbooks from the Umatilla Lightship, stationed 5.2 miles (8.4 km) from shore south of Cape Flattery at Umatilla Reef, reported many gray whales passing close to the lightship from March to May. Whales engaged in various behaviors such as playing, mating, circling, rolling, or feeding, often remaining in the area for up to 4 hours. Pike (1962) also noted sightings 5.8 miles (9.3 km) off Cape Flattery, and a sighting of two adults and one calf as far as 23 miles (37 km) off Cape Flattery. These sightings farther offshore along the Washington coast are consistent with those reported by the following researchers:

[13] Approximately 45 percent of these surveys occurred during December to May.

- Wilke and Fiscus (1961), who sighted over 200 gray whales in late April generally travelling north 6 to 17 miles (9 to 28 km) offshore, just south of the project area in waters over the relatively wide continental shelf between James and Destruction Islands
- Green et al. (1992), who reported a mean offshore distance of 5 miles (8 km) for northbound whales off Oregon and Washington
- Green et al. (1995), who documented phase-one northbound migrants off the coast of Washington from March 11 through 16, 1990, as far out as 12.4 miles (20 km) and averaging a distance of 7.3 miles (11.8 km)
- Calambokidis et al. (2009a), who sighted northbound whales during February to April that tended to be close to shore, with most about 6 miles (10 km) offshore

For the fall/winter southward migration, Herzig and Mate (1984) reported the farthest extent of southbound migrants off the coast of Oregon as 12.4 miles (20 km) from shore at less than 295.3 feet (90 m) deep (Herzig and Mate 1984). When Mate and Poff (1999) repeated the Oregon coast surveys of Herzig and Mate (1984) in 1999, they noted that whales were distributed farther offshore than described in the prior studies. Whereas Herzig and Mate (1984) had reported that 50 percent of both northbound and southbound migrants passed within 1 and 2 miles (1.6 and 3.2 km) from shore, Mate and Poff (1999) estimated that 60 percent of the southbound whales were 5 miles (8 km) or more offshore and 20 percent of the whales were within 3 miles (4.8 km) of shore. These results are consistent with Green et al. (1995), who documented two groups of whales at 14.3 miles (23 km) as the furthest southbound migrants sighted off the coast of Oregon during aerial surveys conducted from January 3 to 12, 1990, and five groups of whales at 26.7 miles (43 km) as the furthest southbound migrants off the coast of Washington. Calambokidis et al. (2009a) sighted gray whales in December and January off the central Washington coast travelling an average of 18 miles (29 km) offshore in depths of 413.4 feet (126 m).

Green et al. (1995) and Green et al. (1992) have noted a significant latitudinal variation between Oregon and Washington for offshore distances of both northbound and southbound migrations. Green et al. (1995) reported that southbound migrants averaged 15.7 miles (25.2 km) from shore off Washington and 7.4 miles (11.9 km) from shore off Oregon. Green et al. (1992) combined both northbound and southbound sightings and reported a statistically significant difference between migrants off Washington (average 11.5 miles [18.5 km] offshore) and migrants off Oregon (average 5.7 miles [9.2 km] offshore). Green et al. (1992) concluded that these differences indicate the width of the migration corridor changes in concert with changes in the shallower depth zones (i.e., the 131.2-foot [40-m] isobath, which is wider off the Washington coast). Green et al. (1995) hypothesized that the difference between offshore distances for northbound and southbound whales either supports the occurrence of a single, very broad migratory corridor, or the occurrence of alternate offshore routes. Like Poole (1984) had noted for the California Bight area, Green et al. (1995) concluded that some portions of the ENP gray whale population may take a more direct route between Washington and the central coast of Vancouver Island, rather than following the longer coastal route past Cape Flattery. Pike (1962) noted that the lighthouse keeper at Amphitrite Point (on the central coast of Vancouver north of Barkley Sound) reported seeing 1,000 northbound gray whales each spring but never seeing them traveling southbound. Shelden et al. (2000) neither confirmed nor rejected the hypothesis of a more direct offshore route, but noted that distance offshore may not be a function of migration alone, because gray whales have been observed 31.1 miles (50 km) off the Vancouver Island coast and 28 to 56 miles (45 to 90 km) off the Washington coast during summer months when the whales are not migrating. Calambokidis et al. (2009a) also reported an unexpected cluster of gray whales 12 to 16 miles (20 to 25 km) off the central Washington coast during the summer.

More recently, Ford et al. (2013) tracked five northbound satellite-tagged gray whales (including three whales that had been sighted in the PCFG seasonal range), from Vancouver Island to southeastern Alaska. They concluded that the majority of whales use the more interior waters of Hecate Strait and Dixon Entrance as their migratory corridor between Vancouver Island and southeastern Alaska. This finding differs from the long-held belief that whales maintain a northwest trajectory along the outer coastline of Haida Gwaii (formerly the Queen Charlotte Islands) once they reach the northern tip of Vancouver Island (Ford et al. 2013). These authors also observed that most whales were within 6.2 miles (10 km) of Bonilla Island (adjacent to the British Columbia mainland), but a substantial portion (22 percent) migrated further offshore and it was likely that some animals passed too far to the west to detect from the island. Also, Calambokidis et al. (2014) noted that three whales tagged on May 31, 2012 and tracked for 3-- to 7 days remained close to shore in localized areas and water depths consistent with gray whale feeding behavior. Two of these whales had previously been photo-identified in the PCFG range.

To summarize, in the project area (or areas immediately adjacent to it in Washington coastal waters) northbound whales tend to travel closer to shore than southbound whales. Although there is considerable variability in these sightings[14], the best available information indicates the following:

- Northbound whales likely migrate within 23 miles (37 km) of shore (averaging 5 to 7 miles [8 to 11 km] offshore) and many whales travel close to shore where their presence can be difficult to detect (Pike 1962; Green et al. 1992; Green et al. 1995).
- Southbound whales have been reported migrating up to 27 miles (43 km) from shore (averaging 9 to 16 miles [14 to 26 km] offshore), with the possibility that some whales may travel far offshore so as to take a more direct route to and from the central coast of Vancouver Island (Pike 1962; Green et al. 1992; Green et al. 1995).

3.4.3.3.3 ENP Abundance and Trends

The ENP gray whale population recovered from as low as 4,000 to 5,000 whales post exploitation (Henderson 1984) to approximately 20,000 whales today (Laake et al. 2012; Durban et al. 2013). NMFS estimates gray whale population size based on systematic shore-based surveys conducted during the whales' southbound migration. Since 1967, NMFS has conducted shore-based counts of southbound gray whales near Carmel, at either Yankee Point or Granite Canyon stations (Rugh et al. 1999; Buckland and Breiwick 2002; Rugh et al. 2005; Rugh et al. 2008). NMFS selected these observation sites because the continental shelf and the corresponding gray whale migratory corridor are relatively narrow. Few whales migrate beyond the visual range of observers on shore (approximately 3.5 miles [5.6 km]) (Shelden and Laake 2002). Aerial surveys showed that 96 percent of southbound gray whales pass within 3 miles (4.8 km) of the shore (Sund and O'Connor 1974), and fewer than 2 percent of the whales migrate beyond the sighting range of observers (Shelden and Laake 2002). These methods and data have been reviewed and accepted by the IWC Scientific Committee and the IWC, the internationally recognized authority on large cetacean management.

Up until 2006, single observers conducted the southbound counts by working in 3-hour shifts throughout daylight hours from mid-December to mid or late-February (Rugh et al. 2005; Rugh et al. 2008). The observers worked independently, scanning the viewing area using binoculars with reticles (vertical marks in the optics) and magnetic compasses to track whale groups as they migrated past the station. When observers spotted gray whales, they hand-recorded the following

[14] Most of the sighting studies reported in this section come from ship- or plane-based surveys capable of covering large expanses of the coastal marine zone. For example, Green et al. (1992) flew aerial transects in the vicinity of the project area that extended from the coastline out to approximately 56 to 68 miles (90 to 110 km) offshore. Green et al. (1995) questioned the feasibility of conducting accurate shore-based gray whale censuses along the Oregon and Washington coasts given the high proportion of whales sighted beyond a shore-based observer's range of view.

data: 1) time of sighting, 2) horizontal bearing, 3) vertical angle, 4) pod size estimate, 5) calf sightings, 6) environmental conditions, and 7) any unusual behaviors (Rugh et al. 2005; Rugh et al. 2008). The horizontal bearing and vertical angle allowed for estimates of distance from shore. On most days during January, when whale counts are at their highest, paired, independent searches are conducted by having a second observer conduct counts nearby (in the same viewing area), but out of sight of the primary observer (i.e., the observers are stationed in separate observation sheds). These independent searches provided a test of the repeatability of the census effort. More detail about the survey protocols used is in Rugh et al. (1993), Shelden et al. (2004), Rugh et al. (2005), Rugh et al. (2008), and Durban et al. (2013).

Data were entered on a computer at the end of each day and field-checked. Following further quality reviews of the database, researchers compared sighting locations and counts from paired observers to establish the probability of missing whales within the viewing area. In the abundance analysis, correction factors were applied to data to account for 1) whales that passed during periods when observers were not present (before and after the census season, at night, or when visibility was poor); 2) whales within the viewing range of observers that were missed (i.e., one observer saw a whale, but the other did not); 3) differential sightability by observer, pod size, distance offshore, and various environmental conditions; 4) errors in pod size estimation; 5) covariance within the corrections because of variable sightability by pod size; and 6) differential travel rates between day and nighttime travel (Hobbs et al. 2004; Rugh et al. 2005; Rugh et al. 2008). Rugh et al. (2005) adjusted the correction factor for nighttime travel from 1.020 (SE equals 0.023), based on radio-tagged whales (Swartz et al. 1987), to 1.0875 (SE equals 0.0363), based on Perryman et al. (1999), where thermal imagery provided quantifiable evidence that whales pass the shore at a higher rate at nighttime.

In preparation for the 2009 IWC Implementation Review of aboriginal subsistence harvest catch limits for ENP gray whales, NMFS biologists at the National Marine Mammal Laboratory (NMML) re-examined the entire series of abundance estimates and considered new information regarding the best methods for expanding the sighting data to estimate population size. NMFS advised the IWC Scientific Committee that the Implementation Review should be delayed while NMML reviewed the entire series of abundance estimates. NMML researchers provided a workplan that elaborated on the revised methods they intended to apply in deriving estimates (including standardizing the various datasets and applying better pod size correction factors) (Breiwick et al. 2009). The researchers completed their review in December of 2009 and re-estimated abundance for all 23 surveys available at that time (Laake et al. 2012). Largely because of corrections for pod size bias, the newly derived abundance estimates between 1967 and 1987 were generally larger than previous abundance estimates, while the opposite was the case for estimates between 1992 and 2006. As a result, Laake et al. (2012) noted that the revised estimates yielded a substantially different trend than previously reported (Rugh et al. 2008), with the peak estimate being a decade earlier (1988 instead of 1998) and the predicted population trajectory remaining relatively flat since 1980.

NMFS researchers improved their survey methodology using a new counting technique during the 2006/2007 southbound migration (Durban et al. 2013). The new technique replaces the previous method of a single observer logging sightings on paper forms with an improved method using two observers and a computer to log and track individual pods. The two-observer method allows for a higher frequency of observations of each whale pod, because one observer is dedicated solely to observing pods, while a second observer focuses on data recording and software tracking of pods. After comparing the old and new counting techniques during simultaneous (2006/2007 and 2007/2008) and independent (post-2006/2007) trials, Durban et al. (2013) concluded that the new approach yielded consistent and more precise estimates that were indicative of a stable population.

Table 3-5 lists abundance estimates of the gray whale population using the revised correction factors and techniques described in Laake (2012) and Durban et al. (2013). Population estimates are always subject to a certain level of uncertainty, and this is represented by the coefficient of variation (CV); a lower CV indicates a higher certainty that an estimate reflects the actual population size. Even though researchers provide point estimates, confidence statistics like the CV should be considered when reviewing abundance estimates and their precision. For example, the point estimate of the most recent abundance was 20,990 whales, but we can only be relatively certain that the true abundance in 2010/2011 was somewhere between 19,000 and 23,000 whales (using rounded figures for the 95 percent confidence interval).

Table 3-5. Gray whale population estimates from southbound sightings 1967/68 to 2010/11.

Year	Population Estimate	Statistical Interval[15]
1967/1968	13,426	10,952 - 15,900
1968/1969	14,548	12,267 - 16,829
1969/1970	14,553	12,186 - 16,920
1970/1971	12,771	10,743 - 14,799
1971/1972	11,079	9,060 - 13,098
1972/1973	17,365	14,642 - 20,088
1973/1974	17,375	14,582 - 20,168
1974/1975	15,290	12,773 - 17,807
1975/1976	17,564	14,603 - 20,525
1976/1977	18,377	15,495 - 21,259
1977/1978	19,538	16,168 - 22,908
1978/1979	15,384	12,972 - 17,796
1979/1980	19,763	16,548 - 22,978
1984/1985	23,499	19,400 - 27,598
1985/1986	22,921	19,237 - 26,605
1987/1988	26,916	23,856 - 29,976
1992/1993	15,762	13,661 - 17,863
1993/1994	20,103	17,936 - 22,270
1995/1996	20,944	18,440 - 23,448
1997/1998	21,135	18,318 - 23,952
2000/2001	16,369	14,412 - 18,326
2001/2002	16,033	13,865 - 18,201
2006/2007	19,126	16,464 - 21,788
Data above from Laake et al. (2012); Data below from Durban et al. (2013)		
2006/2007	20,750	18,860 - 23,320
2007/2008	17,820	16,150 - 19,920
2009/2010	21,210	19,420 - 23,250
2010/2011	20,990	19,230 - 22,900

Sources: Laake et al. (2012); Durban et al. (2013)

Gray whale population estimates rely on the assumptions that all whales migrate as far south as Carmel, California when observers are studying the southward migration, and that most whales will pass offshore within view of the observers. It has not been demonstrated that the entire gray

[15] Data reported in this column depict Confidence Intervals (1967/8-2006/7; Laake et al. 2012) and Highest Posterior Density Intervals (HDPI) (2007/8-2010/11; Durban et al. 2013). Both are terms used commonly by researchers to describe the precision of a point estimate, depending on their method of statistical inference. For example, within a Bayesian statistical framework HDPIs indicate that there is a relatively high probability (signaled by 95th percentile as an interval of certainty) that the true abundance estimate in 2010/2011 falls between 19,230 and 22,900 gray whales. In general, narrower intervals indicate more precise point estimates.

whale population migrates past Carmel every year (Laake et al. 1994; Rugh et al. 2005), illustrating the importance of obtaining a long time-series of estimates across years from which to determine the trend in population size. Observers conducted the last southbound count in 2010/2011 and plan to survey again in 2014/2015 (Murphy 2014).

3.4.3.3.4 ENP Status, Carrying Capacity, and Related Estimates

As noted previously, the ENP gray whale population was formally removed from the ESA list of endangered and threatened wildlife in 1994 (59 Fed. Reg. 21094, June 16, 1994) when NMFS determined that the species had recovered to near its estimated original population size (approximately 21,000 animals) (58 Fed. Reg. 3121, January 7, 1993) and was neither in danger of extinction throughout all or a significant portion of its range, nor likely to again become endangered within the foreseeable future. Some researchers have questioned our conclusion that the population is near its pre-whaling abundance. Recently, Alter et al. (2007; 2012) used estimates of genetic diversity to infer that North Pacific gray whales (both WNP and ENP stocks) may have numbered approximately 96,000 animals over 1,000 years ago (approximately four to five times more numerous than recent abundance estimates for both stocks combined) (Cook et al. 2013; Laake et al. 2012; Durban et al. 2013).[16] Alter et al. (2007) noted that carrying capacity could have declined over time and, if it has, then ENP gray whales may be reduced from historical numbers but may have reached a new, lower carrying capacity today. The most recent stock assessment report for ENP gray whales (Caretta et al. 2014) reports the findings and uncertainties of Alter et al.'s (2007) analysis, and notes that we rely on current carrying capacity in making MMPA determinations because ecosystems change over time, and with those changes the carrying capacity of the ecosystem also changes (Subsection 3.4.2.1.2, Calculating Marine Mammal Population Parameters).

Since the ENP stock of gray whales was delisted in 1994, several analyses have addressed the status and productivity of the stock. In 1994, Wade reported values of K and MNPL for the ENP gray whale stock based on then-current abundance estimates reported between 1967 and 1994. He estimated that the ENP gray whale population was at 51 to 97 percent of its K and that the rate of net production at the MNPL was 0.033 (95 percent confidence interval from 0.023 to 0.044) (Wade 1994). With input from the IWC Scientific Committee, Wade (2002) updated his analysis

[16] Also, Palsbøll et al. (2007) noted that it is unclear if the estimates of Alter et al. (2007) include the now-extinct Atlantic population of gray whales. Alter and Palumbi (2007) ran additional simulations and responded that their estimates of genetic diversity are valid primarily for Pacific gray whales.

with 1995/1996 census data, employed an age and sex structured model, and incorporated an additional factor to deal with unexplained variations in the time series of abundance data.

Later, Wade and Perryman (2002) incorporated the census data from 1997/1998, 2000/2001, and 2001/2002, as well as the calf production data from the northward migration (1994 to 2001), into a more complete analysis to increase the precision of the K estimate. They used a generalized logistic model, which included the added variance of Wade (2002) in the analysis. Based on these data, Wade and Perryman (2002) estimated that the ENP stock was at or near its carrying capacity of 22,000 whales (confidence of 95 percent and confidence intervals ranging from 19,000 to 35,000 whales). The IWC Scientific Committee reviewed the Wade (2002) and Wade and Perryman (2002) assessments and agreed that management advice could be formulated from the results. Both assessments indicated that the population was above the maximum sustainable yield level and was likely close to or above its unexploited equilibrium level (IWC 2002).

In 2008, Rugh et al. assessed data between 1967 and 2007 and included additional correction factors (e.g., to correct for whales not seen by observers at night) to estimate a K of 23,686 whales. Moreover, they identified potential problems in the way that previous abundance estimates had been calculated (especially with respect to pod size estimation). Subsequently, Laake et al. (2009; 2012) developed a more consistent approach to abundance estimation that used a better model for pod size bias with weaker assumptions. Laake et al. (2009; 2012) applied their estimation approach to re-estimate abundance for all 23 shore-based surveys available at the time.

Punt and Wade (2012) re-assessed the ENP gray whale stock using the revised abundance estimates from Laake et al. (2009; 2012). From that assessment, Punt and Wade (2012) estimated the 2009 population (posterior mean of 20,366) to be at 85 percent of K (posterior mean of 25,808), and at 129 percent of MNPL, with a probability of 0.884 (i.e., an 88 percent chance) that the population is above MNPL. Those results were consistent across all the model runs and with previous assessments, and supported a finding that the population was within OSP. In 2010, the IWC Scientific Committee reviewed the analysis by Laake et al. (2009) and adopted the revised abundance estimates for use in the Committee's assessment of aboriginal subsistence whaling on gray whales (IWC 2011a). The Committee also reviewed the analysis of Punt and Wade (2012) and agreed that the results were within the bounds considered in the Committee's gray whale assessment.

IWC Implementation Review of ENP Gray Whales

Subsection 1.2.4.1.3, IWC Aboriginal Subsistence Whaling, describes the IWC's principles and approaches to managing aboriginal subsistence whaling. Under current IWC regulations, aboriginal subsistence whaling of gray whales is only permitted for the Russian Federation and the United States. The Scientific Committee of the IWC has a standing working group (SWG) on the aboriginal whaling management procedure (AWMP) tasked with providing scientific advice on safe catch limits for aboriginal subsistence whaling operations that take into account scientific uncertainty and meet the IWC's management objectives. The key objectives (IWC 1995) guiding the SWG's evaluation are:

1. Ensure risks of extinction are not seriously increased (highest priority)
2. Enable harvests in perpetuity appropriate to cultural and nutritional requirements
3. Maintain stocks at highest net recruitment level, and if below that ensure they move towards it

The goal of the AWMP evaluation is not to maximize whale catches, but instead to determine whether the number of animals requested for aboriginal subsistence needs exceeds a safe catch limit for a particular stock of whales.

The SWG's advice involves using computer simulations to test various methods for determining catch limits; these methods are referred to as AWMPs. Simulations consist of replicated calculations of stock trajectories using plausible whaling scenarios and 100-year simulated management with each candidate AWMP (Givens 1999). These simulations take into account uncertainty in a large number of factors, including whale population structure, abundance and trends, historic and future catch levels, reproduction and survivorship, and environmental conditions. An AWMP comprises two components: an assessment and a strike limit algorithm (SLA). The assessment is a statistical procedure that attempts to estimate certain parameters or variables given the available data. The SLA is a rule that provides a safe catch limit/quota given the assessment estimates obtained (Givens 1999). The SLAs are intended for long-term use but are typically reviewed on a frequent basis (usually every 5 years in an Implementation Review) to take into account any new information. In addition, unscheduled Implementation Reviews can be initiated if new information, such as a major mortality event, creates a serious concern (IWC 2003).

In 2004, the Scientific Committee developed several candidate SLAs for gray whales that tested for a broad range of uncertainty in a variety of factors, including changes in maximum sustainable yield rate and level (MSYR and MSYL); model uncertainty; time-dependent changes in carrying capacity, natural mortality, and productivity; episodic events; stochasticity; survey bias and variability; and survey frequency and errors in the historic catch series[17] (IWC 2005b). The overall performance of the candidate SLAs was judged by a combination of 1) an examination of the detailed conservation and need satisfaction statistics (per the AWMP objectives identified above) for each of the Evaluation Trials and Robustness Trials[18], and 2) human integration of these results in the context of the relative plausibility each SWG member assigns to the individual trials. The Scientific Committee presented the IWC with its recommended gray whale SLA in 2004 and this was endorsed by the Commission (IWC 2005a; IWC 2005b), which noted that "…this SLA meets the objectives of the Commission set out in 1994 and represents the best scientific advice that the Committee can offer the Commission with respect to the management of the eastern North Pacific stock of gray whales."[19] Although the Commission went on to approve a catch limit that was consistent with the joint Russian Federation/U.S. request (140 whales per year), the Scientific Committee determined that up to 463 ENP whales per year was a sustainable take for at least the medium term (approximately 30 years) and a level of take that is "likely to allow the population to remain above maximum sustained yield level" (IWC 2003).

The next scheduled Implementation Review (in 2009) was postponed because a number of key analyses were not ready in time. The most recent Implementation Review for ENP gray whales was completed in 2010, at which time the Scientific Committee concluded that the ENP population as a whole was in "a healthy state" and that the gray whale SLA could continue to be used to provide advice on the Russian (Chukotkan) hunt (IWC 2011a). That advice translates to aboriginal harvest levels in the current IWC schedule (IWC 2012a; NMFS 2012a) that sets a 6-year[20] catch limit for 2013 through 2018 of 744 ENP gray whales, limited to 140 whales per year (reviewable annually by the IWC and its Scientific Committee). The IWC set this catch limit for

[17] As a conservative approach, the SLA operates with the assumption that all struck whales die.
[18] Simulation trials are divided into those considered most likely (the base-case or "Evaluation" trials) and those considered less plausible, but for which performance should be adequate ("Robustness" trials) (Punt and Donovan 2007).
[19] In response to concerns about what might happen if no gray whale surveys occur for longer than a 10-year period, the Chair of the SWG explained that, consistent with IWC deliberations in 2002, "unless an agreed abundance estimate was forthcoming, then the block limit for the following block would be half that for the present block, after which it would revert to zero" (IWC 2005a).
[20] In 2012 the IWC agreed to move from annual to biennial meetings. As a result, the IWC changed the 5-year blocks for ENP gray whale catch limits to 6-year blocks. In its report, the Committee noted that while the gray whale SLAs support setting catch limits for blocks of even numbers of years (up to 8 years), it would not be appropriate for catches to be left unchanged if new abundance estimates were not available after 10 years (IWC 2012a).

the ENP gray whale stock after considering a joint request from the U.S. and the Russian Federation. By a bilateral agreement between the two countries (Ilyashenko and Wulff 2013; 2014)[21], the ENP gray whale catch limit is currently allocated as follows:

- Chukotka Natives: up to 135 whales per year
- Makah Tribe: up to 5 whales per year

In 2011, the IWC Scientific Committee affirmed that "the Gray Whale SLA remains the appropriate tool to provide management advice for eastern North Pacific gray whales apart from the PCFG animals that are part of the ongoing work of the SWG on the AWMP for an Implementation Review" (IWC 2012l). At that time, the Committee also began a new Implementation Review focusing on SLA trials to take into account possible catches of PCFG whales in a Makah hunt (refer to Subsection of 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates, IWC Implementation Review of PCFG Whales) and also recognized the need for additional studies on possible hunt-related conservation implications for western gray whales. In 2012, the SWG agreed that the Gray Whale Implementation Review was completed and in 2013 confirmed that "the proposed [Makah] management plan meets the conservation objectives of the Commission provided that if struck and lost animals are not proposed to be counted toward the APL [i.e., an allowable PCFG bycatch level], then a photo-identification research programme to monitor the relative probability of harvesting PCFG whales in the Makah U&A is undertaken each year and the results presented to the Scientific Committee for evaluation" (see Subsection 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales).

NMFS Stock Assessment Report for ENP Gray Whales

In the most recent stock assessment (Carretta et al. 2014), we reported the findings of Punt and Wade (2012) and noted that even though the stock is within OSP, abundance will fluctuate as the population adjusts to natural- and human-caused factors affecting the carrying capacity of the environment (Rugh et al. 2005; Rugh et al. 2008). A population close to or at the carrying capacity of the environment will be more susceptible to fluctuations in the environment (Moore et al. 2001). The recent correlation between gray whale calf production and environmental conditions in the Bering Sea (Perryman et al. 2002; Perryman and Weller 2012) may be an example of this. Overall, the population has nearly doubled in size over the first 20 years of

[21] The agreements also include notification commitments, and states that the two countries may hold discussions regarding the transfer of unused takes from one native group to the other.

monitoring, and has fluctuated for the last 30 years around its average carrying capacity. For this reason, it can be predicted that the population will undergo fluctuations in the future that may be similar to the 2-year mortality event that occurred in 1999 to 2000 (Norman et al. 2000; Pérez-Cortés et al. 1999; Brownell et al. 2001; Gulland et al. 2005).

For all marine mammal stocks, we prepare stock assessment reports (e.g., Carretta et al. 2014) that include a calculation of the PBR for the stock and an assessment of whether all human-caused mortality exceeds PBR. If total average mortality remains below PBR, a stock at OSP will remain there, and any stock below OSP will continue to grow and will achieve OSP (Wade and Angliss 1997; Wade 1998). As long as the mortality average over the 3-year period is less than PBR, it is considered sustainable within the framework of the PBR management strategy (Wade and Angliss 1997). Carretta et al. (2014) reported that PBR for ENP gray whales is 559 whales based on a minimum population size (Nmin) of 18,017 whales, one-half of the estimated Rmax of 0.062, and a recovery factor of 1.0 for a stock above MNPL (Punt and Wade 2012), calculated thus: 18,017 x 0.031 x 1.0 = 559. The annual averaged human-caused mortality and serious injury between 2007 and 2011 was 127 gray whales, which is considerably lower than the current PBR (Carretta et al. 2014). The average includes mortality associated with the Chukotka Native aboriginal harvest (123 whales), commercial fisheries (2.45 whales), and ship strikes (2.2 whales). The mortality is also lower than the strike limit of 145 whales per year that the IWC Scientific Committee considered would not harm the stock (IWC 2010a)[22] and the 463 whales that the Committee determined could be taken annually (IWC 2003). Table 3-6 summarizes estimated levels of PBR and annual human-caused mortality and serious injury reported in stock assessment reports from 1998 through 2013.

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[22] The IWC catch limit is 140 whales per year; however, the Scientific Committee evaluated strike limit algorithms with an additional five whales added to the annual maximum (i.e., 145 whales) to account for ‘stinky’ whales. Russian authorities do not count such whales against the quota because they do not meet the food needs of the indigenous people (IWC 2013a).

1 Table 3-6. ENP gray whale human-caused mortality estimates from NMFS Stock Assessment
2 Reports (SARs) 1998 to 2013.

SAR Year	Publication Date – NMFS Citation	PBR	Estimated Annual Level of Human-caused Mortality and Serious Injury[1]
1998	December 1998 - NOAA Technical Memorandum NMFS-AFSC-97	432	Ship Strikes = 1 Commercial Fisheries = 4 Subsistence Harvest = 43 *Total = 48*
1999	December 1999 - NOAA Technical Memorandum NMFS-AFSC-110	432	Ship Strikes = 1 Commercial Fisheries = 4 Subsistence Harvest = 43 *Total = 48*
2000	December 2000 - NOAA Technical Memorandum NMFS-AFSC-119	649	Ship Strikes = 1 Commercial Fisheries = 6 Subsistence Harvest = 76 *Total = 83*
2001	December 2001 - NOAA Technical Memorandum NMFS-AFSC-124	575	Ship Strikes = 1 Commercial Fisheries = 6 Subsistence Harvest = 76 *Total = 83*
2002	December 2002 - NOAA Technical Memorandum NMFS-AFSC-133	575	Ship Strikes = 1 Commercial Fisheries = 9 Subsistence Harvest = 97 *Total = 107*
2003	August 2004 - NOAA Technical Memorandum NMFS-AFSC-144	575	Ship Strikes = 1 Commercial Fisheries = 9 Subsistence Harvest = 97 *Total = 107*
2005	December 2005 - NOAA Technical Memorandum NMFS-AFSC-161	442	Ship Strikes = 1 Commercial Fisheries = 7.4 Subsistence Harvest = 122 *Total = 130.4*
2006	January 2007 - NOAA Technical Memorandum NMFS-AFSC-168	417	Ship Strikes = 1.2 Commercial Fisheries = 6.7 Subsistence Harvest = 122 *Total = 129.9*
2007	February 2008 - NOAA Technical Memorandum NMFS-AFSC-180	417	Ship Strikes = 1.2 Commercial Fisheries = 6.7 Subsistence Harvest = 122 *Total = 129.9*
2008	April 2009 - NOAA Technical Memorandum NMFS-AFSC-193	417	Ship Strikes = 1.2 Commercial Fisheries = 6.7 Subsistence Harvest = 122 *Total = 129.9*
2009	February 2010 - NOAA Technical Memorandum NMFS-AFSC-206	417	Ship Strikes = 1.2 Commercial Fisheries = 6.7 Subsistence Harvest = 122 *Total = 129.9*

SAR Year	Publication Date – NMFS Citation	PBR	Estimated Annual Level of Human-caused Mortality and Serious Injury[1]
2010	May 2011 - NOAA Technical Memorandum NMFS-AFSC-223	360	Ship Strikes = 1.2 Commercial Fisheries = 3.3 Unlawful Hunt = 1[2] Subsistence Harvest = 121 *Total = 126.5*
2011	May 2011 - NOAA Technical Memorandum NMFS-AFSC-234	360	Ship Strikes = 1.2 Commercial Fisheries = 3.3 Unlawful Hunt = 1 Subsistence Harvest = 121 *Total = 126.5*
2012	January 2013 - NOAA Technical Memorandum NMFS-SWFSC-504[3]	558	Ship Strikes = 2.2 Commercial Fisheries = 3 Subsistence Harvest = 123 *Total = 128.2*
2013	August 2014 - NOAA Technical Memorandum NMFS-SWFSC-532	559	Ship Strikes = 2.2 Commercial Fisheries = 2.45 Subsistence Harvest = 123 *Total = 127*

1. These estimates are typically based on recent 5-year averages.
2. This is the first reporting in the SAR of the whale killed near Neah Bay in September 2008.
3. Beginning in 2012, responsibility for the gray whale SAR was transferred to the NMFS Southwest Fisheries Science Center.

In summary, we have determined that the ENP stock of gray whales is currently within OSP and appears to be fluctuating at or near its carrying capacity (Carretta et al. 2014) (Figure 3-8). Evidence of this stock's resilience includes:

- Significant population increase from depressed levels in the 1960s
- Rebound from a significant die-off in 1999/2000
- Persistence despite aboriginal subsistence harvest averaging more than 127 whales per year since 1978, including 111 to 143 whales harvested per year since the die-off in 1999/2000 (refer to Subsection 3.17.3.2, Worldwide Whaling)
- Flexible feeding adaptations that allow whales to switch between benthic and pelagic prey
- Potential range expansion, including recent winter-time use of the Arctic and sightings in the Atlantic/Mediterranean and off Africa

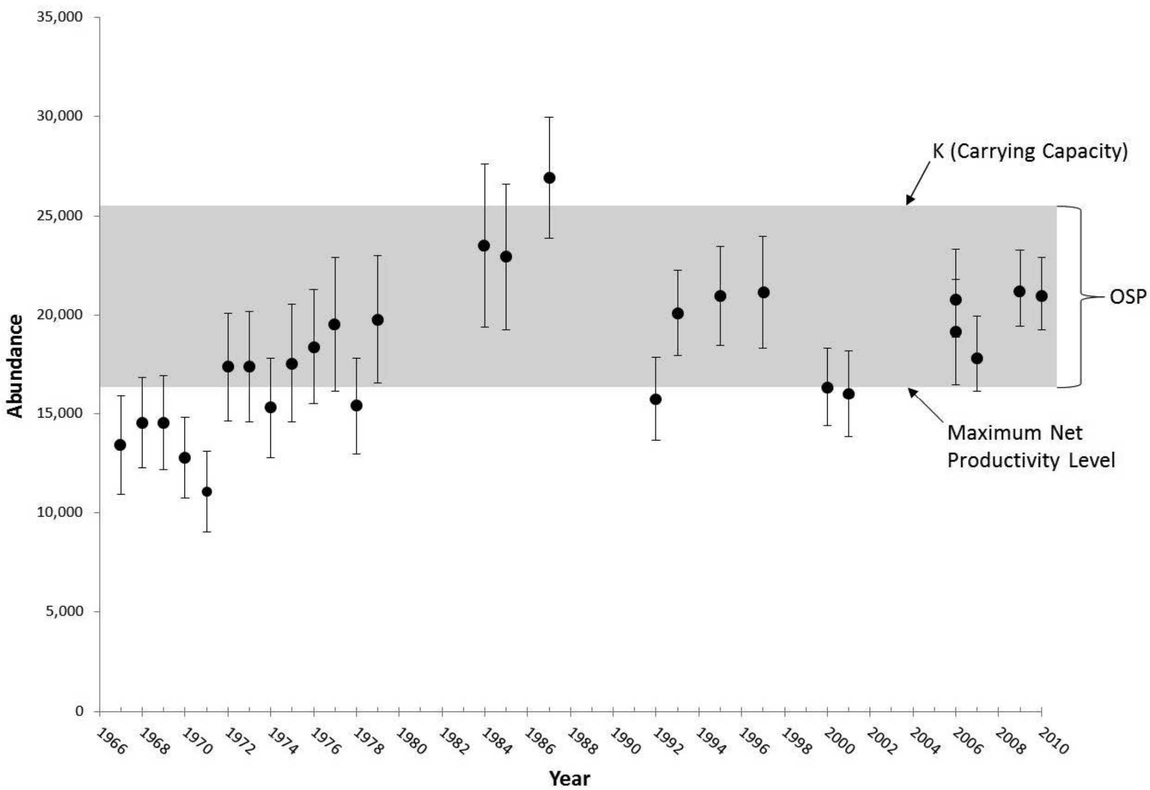

Figure 3-8. ENP gray whale population size, 1967 to 2010. Dual estimates for 2006 reflect the change in counting technique described in Durban et al. (2013). OSP zone based on estimates by Punt and Wade (2012).

3.4.3.4 Pacific Coast Feeding Group (PCFG) of Gray Whales

Not all ENP gray whales make the full migration every year to feeding grounds north of the Alaska Peninsula/Aleutian Islands (Figure 3-3). Since the 1920s, gray whales have been documented feeding south of the Aleutians during the late spring, summer, and fall feeding periods, past the times typically associated with the end of the spring northward migration and before the times typically associated with the onset of the fall southward migration. Between late spring and fall, gray whales have been observed off coastal Mexico (Patten and Samaras 1977); southern, central, and northern California (Mallonée 1991; Calambokidis et al. 2004a); southern and central Oregon (Herzig and Mate 1984; Sumich 1984); northern Washington and northern Puget Sound; southwest and western Vancouver Island; British Columbia and north British Columbia (Darling 1984); and Sitka and Kodiak, Alaska (Calambokidis et al. 2002; Calambokidis et al. 2004a; Moore et al. 2007; Gosho et al. 2011). Feeding gray whales occurred off California even in the 1920s when population numbers were very low (Clapham et al. 1997; Moore et al. 2007).

In the literature, these observations have often been described as summer sightings (Gosho et al. 2001), and researchers have used the term 'summer' to refer to a longer period than is generally associated with the season, describing sightings off the Washington coast between June 1 and November 30 as summer feeding (e.g., Calambokidis et al. 2002; Calambokidis et al. 2004a). Whales seen during this period have been variously termed summer feeders, summer residents, summer population, seasonal residents, stragglers, the Washington feeding aggregation, the summer feeding aggregation, the southern feeding group, the Pacific Northwest feeding aggregation, the Pacific Coast Feeding Aggregation (PCFA)[23], and Pacific Coast Feeding Group (PCFG) (Pike 1962; Darling 1984; Quan 2000; NMFS 2001a; Calambokidis et al. 2002; Calambokidis et al. 2004a; Moore et al. 2007; Frasier et al. 2011; IWC 2010a).

In our 2008 draft EIS (NMFS 2008a), we noted that "[t]here is no evidence that the whales feeding in this portion of the summer range [the PCFG range] are genetically or demographically unique, and both NMFS and the IWC continue to treat ENP gray whales as a single stock for management purposes." Since then, various studies and reviews by NMFS, IWC, and other scientists have revealed genetic evidence relevant to demographic independence (Subsection 3.4.2.1.6, Stock Assessment Reports) indicating that the PCFG of gray whales may warrant consideration as a stock. The following subsections describe the current state of knowledge about the whales in the PCFG range and specifically about whales that have been sighted in the Makah U&A and also in the area from Oregon to Southern Vancouver Island (OR-SVI).

This EIS focuses on those PCFG whales sighted in the Makah U&A in response to the Ninth Circuit decision in *Anderson v. Evans* (2004). The court found that the geographic scale of our inquiry in the 2001 EA at issue in that case was not sufficiently fine. The court concluded that we must consider not just effects to the PCFG whales, but effects to the smaller group of whales frequenting the Makah Tribe's U&A. The court referred to these whales as the "relatively small group of whales [that] comes into the area of the Tribe's hunt each summer,... about sixty percent of [which] are returning whales (although, again, not necessarily whales returning annually)" (*Anderson v. Evans* 2004). In holding that NMFS was required to prepare an EIS, the court focused on impacts to the "local area."

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[23] PCFA was the term used in the *Anderson v. Evans* case, the Tribe's waiver application, and the 2008 DEIS, but it is now superseded by the term PCFG.

> *Even if the eastern Pacific gray whales overall or the smaller PCFA group of whales are not significantly impacted by the Makah Tribe's whaling, the summer whale population in the local Washington area may be significantly affected. Such local effects are a basis for a finding that there will be a significant impact from the Tribe's hunts. See 40 C.F.R. § 1508.27(a). Thus, if there are substantial questions about the impact on the number of whales who frequent the Strait of Juan de Fuca and the northern Washington Coast, an EIS must be prepared (Anderson v. Evans 2004).*

In addition to focusing on PCFG whales sighted in the Makah U&A, this EIS focuses on PCFG whales sighted in the larger OR-SVI because the Tribe proposes to use the abundance of that group of whales as the basis for estimating the allowable annual harvest of PCFG whales because of the high degree of mixing of whales seen in the Makah U&A and this larger area. In this EIS, we define these entities as follows:

PCFG whales: Gray whales observed in at least 2 years between June 1 and November 30 in the PCFG area (between 41°N and 52°N) and entered into the Cascadia Research Collective's photo-identification catalog. For purposes of determining whether a harvested whale is a PCFG whale (i.e., counts against a bycatch or mortality limit), the Tribe's proposal would include cataloged whales seen in at least 1 year, while the other action alternatives in this EIS would include cataloged whales seen in 2 or more years or at least once in the past 4 years.

OR-SVI whales: PCFG whales observed in any survey area from southern Oregon to southern Vancouver Island (excluding areas in Puget Sound).

Makah U&A whales: PCFG whales observed in either the northern Washington survey area (from Cape Alava to Cape Flattery) or Strait of Juan de Fuca survey area (from Cape Flattery to Admiralty Inlet).

3.4.3.4.1 PCFG Population Structure

Although the 2008 DEIS referred to the Pacific Coast Feeding Aggregation, the currently accepted term is PCFG, originating from the IWC's 2010 Scientific Committee report (IWC 2010a) that states "the Committee agrees to refer to the animals that spend the spring, summer and autumn feeding in coastal waters of the Pacific coast of North America from California to southeast Alaska as the Pacific Coast Feeding Group or PCFG" (see also Subsection 3.4.3.1.2, Global Distribution and Population Structure). In that report the Committee also noted that research by Calambokidis et al. (2010)[24] had identified two groups of gray whales using the

[24] This research is part of an ongoing collaborative effort among a number of research groups to compile and identify individual gray whales photographed in 15 survey areas from southern California to Kodiak, Alaska. The photo-identification data are cataloged in a database maintained by the non-governmental

Pacific Northwest after June 1: 1) PCFG whales that return frequently and account for the majority of sightings and 2) a second group of apparent “stragglers” from the migration seen in only 1 year, generally for shorter periods and in more limited areas. Moreover, after reviewing results from photo-identification, telemetry, and genetic studies available in 2010 (i.e., Calambokidis et al. 2010; Mate et al. 2010; Frasier et al. 2011), the Committee agreed that the hypothesis of the PCFG being a demographically distinct feeding group was plausible and warranted further investigation (IWC 2010a). Subsequent IWC investigations have centered on developing and evaluating strike limit algorithms for hunting in the Pacific Northwest, with a primary emphasis on the PCFG (Subsection 3.4.3.4, PCFG Status, Carrying Capacity, and Related Estimates, IWC Implementation Review of PCFG Whales).

The IWC’s general description of the PCFG was refined at a 2011 workshop (consisting of the IWC’s standing working group on the development of the Aboriginal Whaling Management Procedure) focused on the proposed Makah hunt and the PCFG (IWC 2011b). A key analysis reviewed at that workshop was the photo-identification study by Calambokidis et al. (2010) which corroborated earlier observations (e.g., Calambokidis 2004a) that there is a concentration of gray whale sightings in survey areas ranging from Northern California (“NCA” at 41°N Latitude) and northern British Columbia (“NBC” at 52°N Latitude), and that whales seen after June 1 were more likely to be seen multiple times, in multiple years, and multiple survey areas than whales seen before June 1. The workshop also noted that genetic samples had been taken from across this range and few if any whales are still migrating north through the 41°N to 52°N region from June 1 to November 30 (IWC 2011b). The resultant PCFG definition was articulated in the IWC’s 2011 Report of the Scientific Committee (IWC 2011c) as:

> *PCFG whales are defined as gray whales observed (i.e., photographed) in multiple years between 1 June and 30 November in the PCFG area (between 41°N and 52°N).*

The Committee’s report goes on to note that “[n]ot all whales seen within the PCFG area at this time will be PCFG whales and some PCFG whales will be found outside of the PCFG area at various times during the year” (IWC 2011c). The most recent NMFS stock assessment report for gray whales (Carretta et al. 2014) also notes that some members of the PCFG may inhabit a larger range than has been used in IWC analyses of the PCFG, but concludes that “the PCFG appears to

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organization Cascadia Research Collective in Olympia, Washington, which was co-founded by John Calambokidis who has co-authored many of the reports cited in this section.

be a distinct feeding aggregation and may warrant consideration as a distinct stock [under the MMPA] in the future."[25]

The current definition for the PCFG is somewhat more restrictive than the Tribe's description of the Pacific Coast Feeding Aggregation (PCFA) used in its waiver request that states, "for the purposes of this request, the PCFA is defined as any Eastern North Pacific gray whale found in the photo-identification database maintained by NOAA's National Marine Mammal Laboratory (NMML) which has been observed south of Alaska from June 1 through November 30 in any year." The main differences between the current PCFG definition and the definition in the Tribe's application are: 1) the photo-identification database/catalog is actually maintained by the Cascadia Research Collective, not NMML[26]; and 2) the Tribe's proposal would limit the incidental killing of a potentially larger group of whales, in that it would take into account animals sighted even *once* as well as animals sighted *south* of 41°N (Northern California) during June 1 to November 30.

PCFG Genetics and Recruitment

Early genetic studies of PCFG whales focused on evaluating recruitment patterns, with simulations indicating that genetic differences would be detected if the PCFG originated from a single colonization event in the past 40 to 100 years without subsequent external recruitment[27] (Ramakrishnan and Taylor 2001). However, a subsequent analysis by Steeves et al. (2001) failed to detect differences when 16 samples collected from known PCFG whales using Clayoquot Sound, British Columbia, were compared with 41 samples collected from individuals presumably feeding farther north. Additional genetic analysis with an extended set of samples (n=45) collected from whales within the PCFG range indicated that genetic diversity and the number of mtDNA haplotypes were greater than expected (based on simulations) if recruitment into the PCFG were exclusively internal (Ramakrishnan et al. 2001). However, both simulation-based studies focused on evaluating only the hypothesis of founding by a single and recent colonization

[25] Although interior waters making up Puget Sound are within the PCFG latitudinal boundaries of 41°N to 52°N, whales sighted in Puget Sound were not included in the IWC analysis and are considered outside the range of the PCFG. Previous research has found that the few whales sighted in Puget Sound are typically seen only in the spring (especially in northern Puget Sound), are less likely to be seen in multiple years and regions, and likely represent migratory animals (Calambokidis et al. 2002; Calambokidis et al. 2003; Calambokidis et al. 2004a; Calambokidis 2008; Calambokidis et al. 2009a).

[26] Although NMML scientists do provide photographs that are included in the catalog.

[27] External recruitment refers to the addition of individuals to a group via animals that were previously located outside the group (i.e., immigrants). Internal recruitment refers to births.

event and did not evaluate alternative scenarios, such as recruitment of whales from other areas into the PCFG (Ramakrishnan and Taylor 2001; Ramakrishnan et al. 2001).

Recently, Frasier et al. (2011) compared mtDNA sequence data from 40 individuals from the PCFG summer range with published sequences generated from 105 samples collected from ENP gray whales, most of which stranded along the migratory route between southern California and Chukotka, Russia (LeDuc et al. 2002). The mtDNA haplotype diversity found among samples of the PCFG was high and similar to the larger ENP samples, but significant differences in mtDNA haplotype distribution and in estimates of long-term effective population size were found. Based on these results, Frasier et al. (2011) concluded that the PCFG qualifies as a separate management unit under the criteria of Moritz (1994) and Palsbøll et al. (2007)[28]. The authors noted that PCFG whales likely mate with the rest of the ENP population and that their findings were the result of maternally-directed site fidelity of whales to different feeding grounds. In other words, calves (male or female) who accompanied their mothers to the feeding ground would return in subsequent years.

A subsequent study by Lang et al. (2011b) assessed stock structure of whales that use feeding grounds in the ENP using both mtDNA and eight microsatellite markers. Small but statistically significant mtDNA differentiation was found when samples from individuals (n=71) sighted over 2 or more years within the range of the PCFG were compared to samples from whales feeding north of the Aleutians (n=103) as well as when the PCFG samples were compared to the subset of samples collected off Chukotka, Russia (n=71). No significant differences were found when these same comparisons were made using nuclear data. The authors concluded that 1) the significant differences in mtDNA haplotype frequencies between the PCFG and whales sampled in the northern areas indicate that the use of some feeding areas is being influenced by internal recruitment (e.g., matrilineal fidelity), and 2) the lack of significance in nuclear comparisons suggests that individuals from different feeding grounds may interbreed. The level of mtDNA differentiation identified, while statistically significant, was low, and the mtDNA haplotype diversity found within the PCFG was similar to that found in the northern feeding area strata. Lang et al. (2011b) suggested that these findings could be indicative of relatively recent

[28] Moritz (1994) defined ‘management units’ as populations with significant divergence of allele frequencies at nuclear or mitochondrial loci, regardless of the phylogenetic distinctiveness of the alleles. Palsbøll et al. (2007) proposed that the identification of such units from population genetic data should be based upon the amount of genetic divergence at which populations become demographically independent instead of a criterion that focuses on rejecting a hypothesis of random mating.

establishment of the PCFG but could also be consistent with a scenario in which external recruitment into the PCFG is occurring.

A more recent study by D'Intino et al. (2012) compared whales sampled off Vancouver Island and representing the PCFG (n=82 animals) to whales sampled at the calving lagoon at San Ignacio (n=51 animals). They found no nuclear DNA evidence for population differentiation between these two areas, indicating that that the two sampled groups come from the same interbreeding population. They concluded that taken together, the available photo-identification and genetic data indicate seasonal subdivision of gray whales on summer feeding grounds, but with no such substructuring during the mating season, where all individuals represent one gene pool and that maternally-directed site fidelity to different feeding areas (such as the PCFG range) leads to mtDNA differentiation among feeding areas.

Researchers have documented differences in mtDNA that reflect strong site fidelity to summer feeding areas for humpback whales in the North Atlantic and North Pacific (Baker et al. 1990; Larsen et al. 1996). The documented mtDNA differences between humpbacks in different feeding areas indicate that calves learn to use specific feeding areas from their mothers, and they subsequently pass that knowledge to their offspring (a concept known as maternally directed fidelity or familial recruitment) (Palsbøll et al. 1995; Larsen et al. 1996; Palsbøll et al. 1997). Long-term re-sighting histories of individual humpback whales in the North Atlantic further demonstrate very high annual return rates to specific feeding grounds and minimal interchange among such regions (Clapham et al. 1993; Stevick et al. 2006). The apparent difference in site fidelity between humpback and gray whales (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements) may be due to the geographic structure of the migratory route between the summer and winter grounds. For humpback whales, the migratory routes to isolated feeding areas are direct and often cross deep ocean basins (Baker et al. 1990; Calambokidis et al. 1996; Clapham and Mead 1999; Calambokidis et al. 2002). In contrast, gray whales follow a coastal migratory route that passes PCFG feeding areas. Thus, even if mothers introduce calves to a feeding area, there is a natural mechanism for all gray whales to adopt and/or revisit productive feeding areas (Calambokidis et al. 2004a).

Photo-identification studies also underscore the possible role of matrilineal fidelity in maintaining the PCFG as well as the significant variability in whale sightings in the area. Calambokidis et al. (2014) reviewed the most recent mother-calf data and concluded that a high percentage of surviving calves appear to become part of the PCFG[29]. Between 1996 and 2012 they documented 60 calves accompanying 45 different, probable mothers identified as PCFG whales (including 11 whales seen with calves in multiple years). The number of calf sightings in the PCFG seasonal range during the primary study period (1998 to 2012) averaged 3.9 per year, but varied considerably by year (ranging from 0 to 12 animals). These calf data likely represent a minimum estimate because: 1) researchers did not always note the presence or absence of calves, 2) some calves may not have been identified as such because they had already weaned from their mothers before most surveys could detect them, and 3) some animals also may have been missed by surveyors. Calambokidis et al. (2014) went on to analyze the re-sighting history of calves and found that 60 percent were seen in a year subsequent to the year they were calves (1.8 calves per year on average during 1999 to 2011). Using only the 40 calves seen through 2004 (to allow a longer follow-up period to re-sight animals), 65.5 percent had been re-sighted in a later year. The 34.5 percent not seen in a following year could be the result of the calf dying, the calf not returning to the area or not re-sighted during its return, or the calf not being recognized by photo-identification because of changes in its markings.

There is also evidence that whales with a demonstrated tendency to return to particular feeding grounds may behave differently as young animals or as mothers with calves. Weller et al. (2013) noted that many of the whales identified as calves off Sakhalin Island in the WNP are not re-sighted for many years subsequent to their birth year, but eventually they are again re-sighted in the area. This suggests that young animals may use other areas to feed during their first several years. Calambokidis et al. (2014) noted cases where females that had been regularly sighted in the PCFG area were subsequently sighted as mothers with a calf but outside the PCFG area. Both of these examples highlight the difficulty in assessing whether new whales are external or internal recruits.

While the studies summarized above suggest that internal recruitment (e.g., via matrilineal fidelity) is important in structuring feeding ground use, other evidence suggests that some external recruitment via immigration into the PCFG may be occurring. Lang and Martien (2012) used simulations to examine how much immigration into the PCFG could occur to produce results consistent with the empirical genetic (mtDNA) analyses. The results suggested that the plausible range of immigration is greater than 1 and fewer than 10 animals per year on top of a 2-

[29] Whales are identified as calves when they are accompanied by their mother; thus, once the calf is weaned, it may not be recognized as a calf and this may in turn affect calf estimates.

year pulse of immigration (of 20 animals each year in 2000 and 2001, consistent with the findings by Calambokidis et al. (2014) that a higher than usual number of animals recruited into the PCFG in the years following the 1999 to 2000 gray whale unusual mortality event [Subsection 3.4.3.1.7, Strandings]). Annual immigration of 4 animals (with the 2-year pulse of immigration) produced simulated results that were most consistent with the empirical data. If the PCFG had been founded more recently or the abundance of the PCFG is greater than used in the simulations, it is plausible that no annual immigration could be occurring (still assuming the occurrence of a 2-year pulse of immigration).

Calambokidis et al. (2014) analyzed PCFG sighting data and noted that new whales (i.e., not previously seen) have continued to appear annually, and many of these new whales have subsequently returned and been re-sighted as "recruits." It has also been observed that whales with a longer minimum tenure in the first year they were sighted have higher first-year apparent survival and higher probability of return (i.e., do not permanently emigrate) (Calambokidis et al. 2004a; Weller et al. 2013; Calambokidis et al. 2014). This relationship supports a hypothesis that whales are more likely to return if they find a suitable prey base during their first year in the range of the PCFG during June 1 to November 30.

Weller et al. (2013) reviewed sighting data for non-calf animals from 1998 to 2009 and noted that the recruits:transients ratio in a given year was about 50:50, which is very similar to the 49:51 ratio seen in the more recent and larger data set (1996 to 2011) analyzed by Calambokidis et al. (2014). Calambokidis et al. (2014) also found that during surveys in the PCFG range from 1999 to 2011 (when photo-identification efforts expanded to cover all survey regions), an average of 34 new whales (ranging from 8 to 69) were seen each year. During that time, an average of 14.3 whales (ranging from 1 to 30) recruited each year, and most of these (12.5 on average) were not identified as calves. Calambokidis et al. (2014) also applied various methods to estimate the abundance of PCFG whales (Subsection 3.4.3.4.3, PCFG Abundance and Trends). They observed that abundance estimates have been fairly stable since 2002, indicating that recruitment may currently be offset by losses (either whales dying or permanently emigrating).

Sex Ratio of PCFG Whales

Recent genetic studies by Frasier et al. (2010) and Lang et al. (2010b) sampled dozens of whales (40 to 71 animals) in the PCFG range and found that females made up 59 to 60 percent of the samples. This slight female bias is contrary to earlier studies (Steeves et al. 2001; Ramikrishnan et al. 2001), which found a slight male bias. However, Lang et al. (2010b) noted that results from those earlier studies may have been influenced by small sample sizes (Steeves et al. 2001 analyzed just 16 samples from known PCFG animals) or the laboratory assays used at the time (Ramikrishnan et al. 2001).

NMFS 2012 Workshop on Gray Whale Stock Identification

In the summer of 2012, NMFS convened a workshop with eight agency scientists (i.e., a Task Force) to conduct an objective scientific evaluation of gray whale stock structure as defined under the MMPA and implemented through the agency's 2005 GAMMS guidelines (NMFS 2005b)[30]. Specifically, the Task Force was convened to provide advice on the primary question: Is the PCFG a 'population stock' under the MMPA and GAMMS guidelines? This question has immediate management implications, including how future NMFS stock assessment reports will address gray whale stock structure in the North Pacific, and how to interpret any new information in the context of the Makah Tribe's waiver request.

After reviewing the best existing science available from photo-identification, genetics, tagging, and other studies within the context of the 2005 GAMMS guidelines, the Task Force concluded that there remains a substantial level of uncertainty in the strength of the lines of evidence supporting demographic independence of the PCFG. Consequently, the Task Force was unable to provide definitive advice as to whether the PCFG is a population stock under the MMPA and the GAMMS guidelines. Members of the Task Force ranged in their opinions from strongly agreeing to strongly disagreeing about whether the PCFG should be recognized as a separate stock. The Task Force emphasized that the PCFG is relatively small in number and uses a largely different ecosystem from that of the main ENP gray whale stock.

Key Task Force arguments *for* the PCFG being a demographically independent unit included:

- The PCFG is the only feeding group that does not rely on the dynamics of a sub-arctic ecosystem, and this uniqueness may provide important flexibility to the species as a whole given potential challenges in a changing sub-arctic ecosystem.
- Persistent return of individual whales to specific feeding areas strongly suggests that site fidelity is key to maintaining gray whales as a functioning element of this ecosystem.

[30] The Task Force agreed to use the 2005 GAMMS guidelines during its deliberations because the more recent 2011 draft GAMMS guidelines had not been formally approved. The Task Force also noted that the GAMMS 2005 definition for "demographic isolation" is essentially the same as the GAMMS 2011 definition for "demographic independence" in that neither implies true "isolation" within the context of the MMPA.

- Some genetic analyses (using mtDNA haplotype data) have shown low but significant differences between the PCFG and the larger ENP population, providing indirect evidence of internal recruitment and matrilineally-directed site fidelity to feeding grounds.
- Evidence of internal/calf recruitment that may actually be an underestimate because of survey limitations.

Key Task Force arguments *against* the PCFG being a demographically independent unit included:

- Various lines of evidence (e.g., genetic, photo-identification) indicate considerable and ongoing external recruitment into the PCFG; however, there is considerable uncertainty as to whether external recruitment exceeds internal recruitment.
- Other genetic analyses using mtDNA and nuclear DNA data have not shown significant differences between the PCFG and the larger ENP population.
- A sizable number—approximately 10 percent of the whales that occur in the PCFG area each summer/fall—are transients that otherwise feed north of the Aleutians and serve as a substantial and continuous source of potential recruitment into the PCFG.
- The annual coastal migration route of most ENP gray whales includes the habitat used by the PCFG, making it likely that external recruitment would fill any voids caused by whales being removed from the PCFG.

The Task Force also noted that while the status of the PCFG as a population stock has yet to be resolved, continued research on these whales should be undertaken with particular attention dedicated to collecting data relevant to the question of stock identification.

We have not identified the PCFG as a population stock under the MMPA but has stated that it may warrant consideration as a distinct stock in the future (Carretta et al. 2014). If we were to determine that the PCFG did warrant consideration as a stock under the MMPA then we could take the step of classifying it as a 'prospective stock,' which would entail soliciting public comment and additional scientific information specifically addressing the prospective stock structure. Agency guidelines for assessing marine mammal stocks (NMFS 2005b) note that prospective stocks are expected to become separate stocks in a timely manner unless additional evidence were produced to contradict the prospective stock structure.

3.4.3.4.2 PCFG Seasonal Distribution, Migration, and Movements

In a general sense, gray whales using the PCFG area exhibit a migratory pattern similar to that of whales in the larger ENP stock (Subsection 3.4.3.3.1, ENP Seasonal Distribution, Migration, and

Movements). The following subsections summarize the current knowledge about how PCFG whales use these southern feeding grounds.

Unique Markings of Individual Whales and History of Survey Efforts

In the early 1970s, scientists discovered they could identify individual whales by dorsal area shape, scars, and coloration patterns that are visible above the surface of the water when the whales arch to dive (Darling 1984). Photographing and identifying individual whales, noting the location and time of sighting, and comparing photographs within and between years has allowed scientists to study abundance, distribution, movements, and survival of whales using the southern portion of the ENP gray whale summer range. Over time, researchers have established summer survey areas either because the area is one where whales were likely to be found feeding or because the area is one where a management activity occurs (for example, a counting station along the migration route, or an area where a hunt is proposed). The following discussion focuses on survey areas because that is how data are collected, reported, and analyzed. Although a researcher's designation of a survey area will not necessarily correspond to areas that are biologically meaningful to individual whales or groups of whales, they are nevertheless useful for analyzing local effects.

From 1972 to 1981, researchers conducted photo-identification studies in survey areas off the west coast of Vancouver Island, British Columbia (Hatler and Darling 1974; Darling 1984). Both effort and survey areas varied between years. Survey effort ranged from less than 5 days in 1972 to 54 days in 1976. Five discrete areas were surveyed. Surveys began in the 24.9-mile [40-km] stretch of coast around Wickaninnish Bay near Tofino on the central west coast of Vancouver Island (surveyed from 1972 to 1981). Later surveys extended north to include three more discrete survey areas (Estevan Point, between Clayoquot Sound and Nootka Sound, surveyed from 1976 to 1981; Cape Scott, surveyed in 1977 and 1979; and Calvert Island, surveyed in 1977 and 1979), then survey efforts expanded south to include the West Coast Trail survey area (surveyed from 1979 to 1981). In 1976 and 1977, the greatest number of whales identified in any one summer was 34 (some individuals were re-sighted from prior years), corresponding to maximum effort and including 1 year when four of the five survey areas were surveyed (excluding West Coast Trail, which was added later in 1979). Flights to locate whales missed by the boat-based surveys were carried out weekly in 1976 and sporadically in other years. Sixty-three percent of the identified whales were seen in more than one summer, and 37 percent were identified in only one summer (i.e., they were never re-sighted in a subsequent year). One whale was seen in 7 consecutive years and others were seen across spans of time as long as eight summers but were not seen in every summer.

On the basis of these data, Darling (1984) surmised that 35 to 50 whales were present during 1972 to 1981 off the coast of Vancouver Island in any one summer, but they were not all the same whales each year. During 1975 to 1981, Darling (1984) identified 93 total individual whales that were present in this study area for at least 1 year. Darling (1984) noted that other researchers surveying in areas off of Oregon thought there were approximately 75 total individual whales identified each year of their effort, so he surmised that there were at least 100 gray whales in the British Columbia-Washington-Oregon area in any one summer.

Within-season and between-year movement of identified and re-sighted whales was also recorded. Some identified whales remained in the same survey area throughout the summer; for example, two whales remained in the Wickaninnish Bay survey area for at least 80 days. Other whales traveled considerable distances in search of food; for example, a whale identified in the Wickaninnish Bay survey area reappeared in the Estevan Point survey area 47.9 miles (77 km) away. Between years, identified whales reappeared at least 93.3 miles (150 km) away from where they were in a prior year.

From 1984 to 1993, researchers from Cascadia Research Collective conducted photo-identification studies of eight discrete survey areas in the inland waters of southern, central, and northern Puget Sound and Hood Canal; the Strait of Juan de Fuca; and the outer Washington coast, including Grays Harbor (Calambokidis et al. 1994). Survey efforts varied between summers and areas, ranging from 16 days in 1990 to 50 days in 1991. Calambokidis et al. (1994) developed a catalog of photo-identified whales; 76 individual photo-identified whales were in the catalog by 1993. Of these 76 photo-identified whales, only 17 whales (22.3 percent) were re-sighted in more than 1 year, either in the same area or a different area, including British Columbia. Between-year re-sightings of photo-identified whales were most common in the northern Puget Sound survey area, where five of seven identified whales were re-sighted in subsequent years.[31] They were least common in the southern and central Puget Sound and Hood Canal survey areas, where 1 of 18 identified whales was re-sighted in subsequent years. Individually identified whales were re-sighted an average of 47 days later, and the longest time between first and last sightings in a season was 112 days.

[31] Sightings of gray whales in northern Puget Sound indicate that this area is used briefly each year as a spring-time feeding area for a small regular group of gray whales (Calambokidis et al. 2009a).

These photo-identification efforts collectively demonstrate that some of the gray whales feeding in the southern portion of the ENP summer range remain for extended periods and that some of the whales return to the same general feeding areas in later years, though not necessarily every year (Darling 1984; Calambokidis et al. 1994). The studies also demonstrate that many of the gray whales photo-identified were not re-sighted in subsequent years, that new individuals were photographed every year, and that some whales inhabited different areas in different years (Darling 1984; Calambokidis et al. 1994). These observations were important because they suggested a lack of strong site fidelity (returning to the same previously occupied breeding or feeding location), which can indicate that a particular group of animals is different from the rest of the population in a biologically meaningful way (i.e., genetic or behavioral differences). Such differences can indicate stock structure and demographic independence, which have management implications. Animals with strong site fidelity may be unlikely to move or select new habitats if their traditional habitat becomes less favorable (Switzer 1993; Quan 2000).

In response to the Makah Tribe's request to resume their traditional hunt of gray whales, we initiated photo-identification studies of gray whales off the coast of Washington in 1996 to better understand distribution (including site fidelity and habitat use) and abundance (Gearin and DeMaster 1997; Gosho et al. 1999; Gosho et al. 2001). This was a response to federal conservation and management obligations pursuant to the ESA monitoring plan following the 1994 delisting and was also operating under federal trust obligations triggered by the Makah Tribe's request to hunt gray whales starting in the 1998 to 2002 5-year IWC catch limit time frame (Gearin and DeMaster 1997). We were investigating whether the proposed level of harvest was sustainable for the area. We focused our survey efforts in the Strait of Juan de Fuca (from Tatoosh Island to Sekiu), the northern Washington coast (Tatoosh Island to Carroll Island), and southern Vancouver Island. We noted that the survey area had limitations and indicated that effort should be extended beyond these three areas south to Grays Harbor (the area surveyed by Calambokidis et al. 1999) and north to west Vancouver Island (the area surveyed by Darling 1984) to increase the probability of sighting gray whales in Washington and British Columbia waters (Gosho et al. 1999).

From 1998 to the present, we have funded and collaborated with Cascadia Research Collective, the Makah Tribe, and other researchers to conduct photo-identification surveys of gray whales, primarily in the range of the PCFG. This collaboration has allowed researchers to combine resources and results and cover broader survey areas within the southern portion of the ENP summer range, from southern California to Kodiak Island (Figures 3-9 and 3-10). Effort within survey areas varied, and the number of days in which whales were seen from 1996 to 2012 (June to November) were highest in the survey areas along southern Vancouver Island and just north of Vancouver Island (Calambokidis et al. 2002; Calambokidis et al. 2004a; Calambokidis et al. 2014). Researchers obtained photographic identifications of 146 unique whales per year on average (ranging from 45 to 208) unique whales each year for the 17-year period from 1996 to 2012[32]. From those photographs, 1,303 unique[33] whales have been identified from southern California to Kodiak, Alaska (multiple photographs were taken of most whales in each year, and some whales were seen in more than one year, so the number of photos taken exceeds the number of whales uniquely photo-identified). Of those 1,303 whales, 656 individual whales[34] were identified at least once in the PCFG seasonal range (i.e., June 1 to November 30 between northern California and northern British Columbia). Of the whales sighted during 1999 to 2011 (when surveys were more consistent and excluding 2012 because those whales have not had a chance to be re-sighted), approximately 42 percent (186 out of 442 animals) were identified at least twice in the PCFG seasonal range.

[32] For comparison, the 2008 DEIS reported on available sightings data for the 8-year period from 1998 to 2005.
[33] A ‘unique whale’ or ‘identified whale’ is an individual gray whale that has been identified from photographs and cataloged using a code unique to that animal (e.g., CRC 1045).
[34] The Cascadia Research Collective’s database includes gray whale sightings from as far back as 1977. However, the data analyzed here focuses on the 656 identified whales sighted during the 1996 to 2012 timeframe during which there were more consistent and collaborative surveys, and some analyses focus on a subset of those years (1999 to 2011) to account for re-sightings and improved population modeling characteristics (see Calambokidis et al. 2014).

Individual Survey Areas (Area Code) North to South	Combined Survey Areas		
	Makah U&A[35]	OR-SVI	PCFG
Coastal Waters			
Kodiak Alaska (KAK)			
Southeast Alaska (SEAK)			
Northern British Columbia (NBC)			
Western Vancouver Island (WVI)			
Southern Vancouver Island (SVI)			
Strait of Juan de Fuca (SJF)			
Northern Washington Coast (NWA)			
Grays Harbor (GH+)			
Oregon Coast (OR)			
Southern Oregon (SOR)			
Northern California (NCA)			
Central California (CCA)			
Inland Waters			
North Puget Sound (NPS)			
Puget Sound & Hood Canal (PS)			

Figure 3-9. Individual areas surveyed by gray whale researchers. Highlighted cells identify three groupings of survey areas (representing the the Makah U&A, OR-SVI, and PCFG range) analyzed in this EIS.

[35] Although the Makah U&A includes both the NWA and SJF survey areas, only the NWA is under consideration as a proposed hunt area in this EIS.

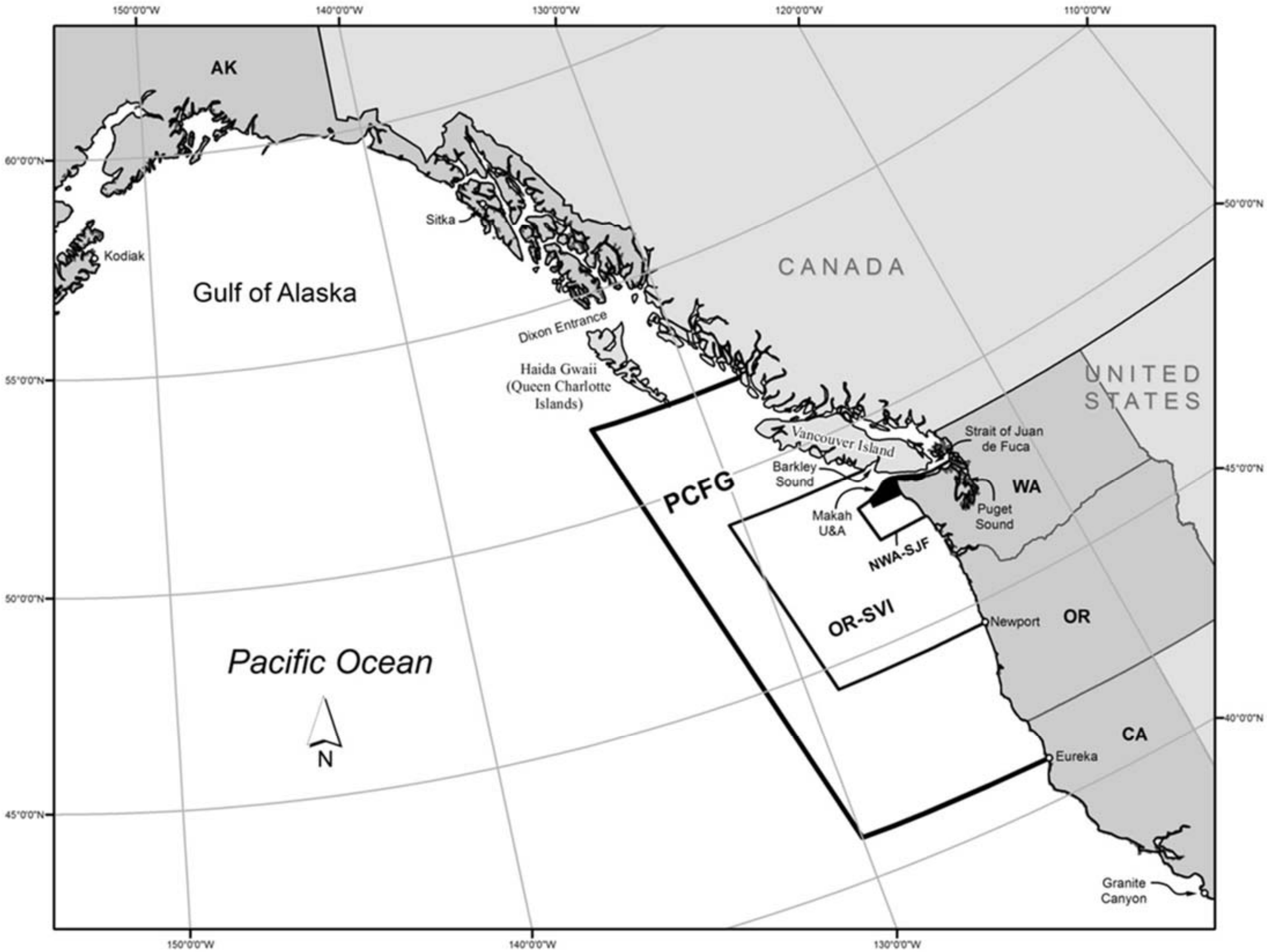

Figure 3-10. Spatial scales associated with the project area; PCFG, OR-SVI, and NWA-SJF (including the Makah U&A) survey areas.

Use of PCFG Survey Areas by Individual Whales

Of the 656 whales identified in the PCFG seasonal range since 1996, 603 animals were first seen prior to 2012 (and so had the opportunity to be seen at least twice) (Calambokidis et al. 2014). Approximately 51 percent of these animals (309 whales) have never been re-sighted, which demonstrates that many of the newly seen whales did not return in a subsequent year. However, a number of whales have been sighted during the summer in the PCFG range in each consecutive year after their first sighting. For example, 7.3 percent (44 whales) of the 603 whales were seen in every summer after their initial identification, including 5 whales that were seen in all 17 years since 1996. The remaining 44 percent (265 whales) were seen more than once but not in every year.

Many whales have an intermittent sighting history, some of which may be explained by sightings in areas adjacent to the PCFG range. For example, some whales were seen in Kodiak and southeast Alaska in years that they were not seen in the PCFG range (Calambokidis et al. 2014). Of the 25 whales identified in southeast Alaska and the 122 whales identified in Kodiak, Alaska, 14 (56 percent) and 20 (16.4 percent), respectively, have been seen farther south in the PCFG range. For example, whale ID#130 was only seen in southeast Alaska in 1999, but had been seen in all other years in the PCFG range. Likewise, whale ID#232 was only seen in Kodiak in 2002, but was seen along Vancouver Island in 2000, 2001, and 2003 and then wasn't seen again until 2011 and may have been somewhere in Alaska waters. Whale ID#152 was photo-identified in Kodiak in 2002, 2005, and 2010, but was seen in the PCFG range as early as 1995 in the Cape Caution, British Columbia, area, and in 1992 in the Clayoquot Sound, British Columbia survey area, but has not been seen in the PCFG range since 1999 when it was seen along the west coast of Vancouver Island. Another example is Whale ID#68, which was seen in northern Washington during 1996 and 1997 and then was seen in southeast Alaska in 1998 and 1999 but not subsequently. Gosho et al. (2011) suspected that the movements within and between Kodiak and PCFG areas to the south are likely driven by food availability and noted that the areas off Ugak Bay are thought to be the deepest foraging locations for gray whales south of the Bering Sea. While these are only a few examples of whale movements, they illustrate the extensive inter-year movement of whales, which partially explains the gaps in the observations for some whales and the disappearance of others from the PCFG. It is clear that many whales are only part of the PCFG temporarily.

Whales seen in the PCFG range exhibited a wide range of movement across and within years. The 118 whales seen in 9 or more years provide a useful example. None of those whales was seen exclusively in a single region, and 68.6 percent were seen in at least four of the nine survey areas from 1996 to 2012. However, whales did regularly visit the same regions across years, with 91.5 percent seen in at least one of the regions during 6 or more of the years they were seen. Of the 118 whales, 67.8 percent were seen in a particular region two-thirds or more of the years they were seen. Southern Vancouver Island (SVI) was the region with the maximum number of years seen for 56 of the 118 whales, which in part reflects the larger amount of survey effort in SVI (Calambokidis et al. 2004a; Calambokidis et al. 2014). Thus, some whales regularly visit particular regions, but they use other regions as well. Calambokidis et al. (2004a) and Calambokidis et al. (2014) also showed that whales seen in more years appeared in more regions.

Within-season movement of photo-identified and re-sighted whales in the summer feeding period can be extensive (Calambokidis et al. 2014). For each survey area examined, movements were greatest between adjacent areas with less movement to distant areas (Calambokidis et al. 1999; Calambokidis et al. 2004a; Calambokidis et al. 2014). This pattern demonstrates that whales do focus on specific areas within the summer season, but they will move in search of food, most likely to neighboring areas. There have been examples of large-scale movements within a year. One whale, originally photo-identified in a southeastern Alaska survey area around September 1999, was re-sighted far south about a month later in a northern California survey area (Calambokidis et al. 2004a). Another whale moved in the opposite direction; researchers originally identified it off southern Vancouver Island during June-July 2003, it swam at least 1,104 nautical miles (2,045 km) in 34 days or less, and it reappeared off Kodiak on August 9, 2003 (Calambokidis et al. 2004a). Within-season and between-year movements of gray whales likely relate to changes in productivity and prey availability. Darling et al. (1998), for example, noted a long-term change in the use of the Wickaninnish Bay survey area off the central west coast of Vancouver Island, British Columbia. From 1966 to 1977, whales were consistently present from May to September, but use of the habitat during summer was becoming less consistent by 1977. Since 1989, whales have been observed feeding mostly on pelagic prey (e.g., crab larvae and swarming amphipods), although occasional bouts of benthic feeding also occurred throughout this time, such as in April 1996 (Darling et al. 1998). Scordino et al. (2014a) reported fewer gray whale sightings in the Makah U&A in June (compared to later in the summer and fall) and noted that those observations, along with available information on movements of satellite-tagged PCFG whales, suggests the possibility that whales who feed in the PCFG range may feed further north (e.g., off Alaska) in the spring and early summer before heading south to the PCFG feeding grounds later in the year.

Similar findings of variable whale movements were reported by Scordino et al. (2011a) during research surveys conducted by the NMML and the Makah Tribe within the Makah U&A during summer and fall 1993 to 2009. Researchers assessed the site fidelity of individual whales by examining minimum residency time and annual capture histories from photographs. These researchers observed that, on average, individual whales using the Makah U&A are observed for a small portion of the June to November feeding season. Most gray whales were seen in only 1 year, and individuals sighted in multiple years averaged periods of 2.2 years between sightings in the Makah U&A. The sighting histories of individual whales did not suggest that gray whales exclusively use the Makah U&A during the summer/fall feeding season. Scordino et al. (2011a) concluded that their results suggest that most gray whales sighted in the Makah U&A do not have strong fidelity to this area. Calambokidis et al. (2014) found that of the whales sighted in regions from NCA to NBC, depending on the region, from 35.5 to 58.8 percent of whales seen in at least 1 year were seen at some point within the Makah U&A, while from 41.3 to 78.9 percent of the whales seen in at least *2 years* were seen at some point within the Makah U&A.

In summary, sightings and photo-identification data show a continuum of gray whale distribution in the PCFG area during summer and fall feeding periods from at least the southernmost survey area in northern California to northern British Columbia, and possibly further north to Southeast Alaska (near Sitka) and Kodiak Island (Calambokidis et al. 2003; Calambokidis 2004a; Moore et al. 2007; Gosho et al. 2011; Calambokidis et al. 2014) and south to central and southern California. Although some gray whales return to the same general feeding area in at least some later years, photo-identification data have demonstrated large-scale movements and variability in gray whale distribution and habitat use within season and between years. These movements and variability are likely due to shifts in prey availability, the opportunistic and diverse nature of the species' feeding ecology (Subsection 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem), and the ability of gray whales to respond rapidly to changes in prey and to explore alternate feeding areas throughout their range (Darling et al. 1998; Dunham and Duffus 2001; Moore et al. 2003; Moore 2005; Moore et al. 2007). This flexibility, coupled with the location of the PCFG area in the midst of the migration route for the entire ENP herd, provides an obvious and natural mechanism for new whales to join the PCFG. However, the evidence for maternally directed site fidelity and the regular, annual return of specific whales to the PCFG underscores the complexity of recruitment processes supporting this feeding aggregation of gray whales.

Proportion of PCFG Whales Sighted in the Makah U&A During the Tribe's Proposed Hunt Period (December 1 to May 31)

In addition to surveying for and photographing whales during the summer feeding period, researchers have also surveyed for and photographed whales during the winter and spring migration period. Although there are far fewer sightings in the coastal portion of the Makah U&A (NWA) during the migration period than during the summer feeding period, there are sufficient data to allow us to estimate the likelihood that Makah hunters would encounter a PCFG whale during a winter or spring hunt in the NWA. The proposed hunt may occur in the NWA after November 30 and prior to June 1. Based on the analysis of Calambokidis et al. (2014), a hunt conducted in spring (March to May) potentially could take whales from the PCFG (although those chances are less in the NWA than in the Strait of Juan de Fuca portion of the Makah U&A). There have been 181 whale sightings[36] in the NWA prior to June 1, of which 40.33 percent (73) were of whales that were seen in the PCFG range after June 1 at some time, 37.02 percent (67) were of whales that were seen in OR-SVI areas after June 1 at some time, and 33.15 percent (60) were of whales that were seen in NWA-SJF areas after June 1 at some time. In comparison, there were 54 whale sightings in the SJF area prior to June 1, of which 70 percent (39) were of whales that were seen in the PCFG range after June 1 at some time, emphasizing the importance of restricting a hunt to coastal waters of the Makah U&A (i.e., the NWA) to limit the take of whales from the PCFG. Scordino et al. (2013) also analyzed the proportion of PCFG whales sighted in the SJF and NWA survey areas from December through May (the proposed hunting season) and found that 31 percent of sightings in the NWA were PCFG whales. Weather conditions are less favorable for surveys during December through February, and the few whales sighted (Scordino et al. (2013) reported fewer than 5 whales during the 1996-2011 timeframe) prevent making informed estimates of the proportion of PCFG whales present during the winter months.

Distribution of PCFG Whales Relative to Shore

Various studies have assessed gray whale distribution relative to shore during the typical winter/spring migration periods of the ENP population, and those are reported in Subsection 3.4.3.3.1, ENP Seasonal Distribution, Migration, and Movements. General descriptions of coastal sightings in the PCFG range can be found in many of those studies and related reports (e.g., Pike 1962; Patten and Samaras 1977; Calambokidis et al. 1997); specific sighting locations relative to shore are not always reported. Relatedly, opportunistic sightings from whale watching operations (charter boat, air services, and shore-based sites/programs) operating throughout the PCFG range

[36] These "sightings" include whales seen on multiple days.

are not typically reported in the published literature. The "Whale Watching Spoken Here" program in Oregon (Oregon Parks and Recreation Department 2013) is one exception. This program posts sightings data online and notes that "summer feeding whales [approximately 200-400 animals] are very close to shore." The following examples from studies published during the past 30 years use maps or cite specific locations/distances from shore to report on gray whale sightings in the PCFG range during the summer/fall:

- Hatler and Darling (1974) combined shipboard sightings and reports of earlier studies (1965 to 1973) to document numerous sightings of gray whales (including mother-calf pairs) during the summer in the vicinity of Wickaninnish Bay, Vancouver Island, B.C. All sightings mapped in this study during the non-migration period were within 1.5 miles (2.4 km) of shore.
- Sumich (1984) used aerial and shore-based observations to document over 1,200 gray whale sightings (including calves) during the summer and within 0.3 miles (0.5 km) of the Oregon coast.
- Darling (1984) used direct observations and photo-identifications over 10 years to document summer resident animals arriving off Vancouver Island as early as April 8 and departing the area as late as December 14. From 1975 to 1981 he sighted from 10 to 34 whales per year feeding during the summer along the coast of Vancouver Island and noted that all were seen within 0.6 miles (1 km) of the shore (most within 328 feet [100 m]), with some seen repeatedly feeding in protected waterways near Tofino, British Columbia.
- Mallonée (1991) reported 50 sightings of summering whales during shore-based observations off the northern California coast (1986 to 1988), noting that some whales could be seen milling in small, restricted areas approximately 0.03 to 0.3 miles (0.05 to 0.5 km) from rocky headlands, in the middle of bays, and at the mouth of the Klamath River.
- Brueggeman et al. (1992) used aerial and shipboard surveys to document 28 gray whale sightings during the summer and fall off the Washington and Oregon coasts, noting that all but one of the summer sightings occurred within bays or within 0.6 miles (1 km) of the coast.
- Calambokidis et al. (1997) observed gray whales over 31 miles (50 km) off the Vancouver Island coast and 28 to 56 miles (45 to 90 km) off the Washington coast during summer aerial surveys in 1997 (as cited in Shelden et al. 2000).

- Dunham and Duffus (2001) reported on dozens of sightings of gray whales foraging within 0.3 miles (0.5 km) of shore from June to September (1996 to 1997) in Clayoquot Sound, Vancouver Island, British Columbia.
- Calambokidis et al. (2004b) documented the presence of 7 gray whales in 5 locations off the Washington coast, averaging 3.1 miles (5 km) from shore in 66 feet (20 m) of water during shipboard surveys conducted in the Olympic Coast National Marine Sanctuary during the summer (1996 through 1998).
- Calambokidis et al. (2009a) observed unusual clusterings of gray whales during shipboard surveys from June to September, 2007, in two areas: one in and around the entrance to Grays Harbor, Washington, and another 12 to 16 miles (20 to 25 km) offshore in waters nearly 200 feet (60 m) deep. The offshore sightings consisted almost exclusively of animals previously identified during the summer in other areas of the Pacific Northwest.
- Scordino et al. (2011a) sighted 189 unique gray whales during summer/fall boat-based surveys conducted between 1993 and 2009 in the Makah U&A. Most gray whale sightings occurred in waters between 26 and 49 feet (8 and 15 m) deep in areas that are characterized by rocky substrate and kelp forests. These researchers speculated that the availability of a prey species (mysid shrimp) may greatly influence gray whale sightings in the area. They also noted that gray whales in the Makah U&A appear to shift from using coastal ocean areas (i.e., the proposed hunt area) in the summer to Strait of Juan de Fuca areas in the fall.

Sighting data collected by Cascadia Research Collective, NMML, and the Makah Tribe in the PCFG range (and the Makah U&A area within the PCFG range) indicate that the vast majority of whales in the proposed hunt area are located within 3.1 miles (5 km) of shore (Scordino et al. 2013; P. Gearin, NOAA Fisheries Research Biologist, pers. comm., May 5, 2014). The concentration of whales close to shore during the summer is not surprising given that PCFG gray whales are actively feeding and would tend to be found in shallower waters with close access to benthic prey as well as mysid shrimp concentrations (Dunham and Duffus 2001; Dunham and Duffus 2002). However, most of the survey effort is also concentrated in nearshore areas and it is possible that surveyors do not see whales that are further offshore. As noted previously, Green et al. (1995) questioned the feasibility of conducting accurate shore-based gray whale censuses along the Oregon and Washington coasts given the high proportion of whales sighted beyond a shore-based observer's range of view.[37] Feeding season boat-based surveys in the Makah U&A are typically conducted within 1.2 miles (2.0 km) of shore because gray whales that summer in the area often congregate around 33 feet (10 m) of depth (Scordino et al. 2014a). These authors also documented whales feeding in deeper waters (98 to 115 feet/30 to 35 m) and gray whales are reported to feed in waters as deep as 164 to 200 feet (50 to 60 m) deep (Jones and Swartz 1984); in the coastal portion of the Makah U&A, such depths extend offshore as far as 9 miles (15 km). Migratory season surveys in the Makah U&A are generally conducted within 3.1 miles (5 km) of shore, but since 2009 have extended as far offshore as 5 to 6.2 miles (8 to 10 km) (Scordino et al. 2013).

In summary, gray whales found in the PCFG range (including the Makah U&A) during the summer/fall are most likely to be found in relatively shallow coastal waters, usually within 3.1 miles (5 km) of shore. Seasonal and year-to-year variability in prey or ocean conditions likely have a great influence on the species' distribution. Gray whales using waters far offshore are probably much less common (e.g., because of the greater diving depths required to pursue benthic prey) and largely undetected given existing survey methods.

3.4.3.4.3 PCFG Abundance and Trends

From the preceding sections it is apparent that the PCFG does not exhibit traits of a completely closed population whose abundance fluctuates solely based on births and deaths of member animals and not on migration into or out of the population. Instead, it appears to have complicated dynamics that likely includes whales with the following characteristics:

- Whales that use the PCFG range based on learning "local knowledge" from their mothers.
- Whales that use the PCFG range on an almost annual basis.
- Whales that use the PCFG range intermittently over the years.
- Whales that used the PCFG range once but never returned (i.e., transients).
- Whales that use the PCFG range for long periods of time in a given season[38].
- Whales that use the PCFG range for short periods of time in a given season.

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[37] Shelden and Laake (2002) estimated that 3.5 miles (5.6 km) was the expected outer viewing limit of shore-based observers at a gray whale counting station near Granite Canyon, CA. Similarly, Sumich (1984) considered 3.1 miles (5 km) as the practical maximum distance that gray whales could be reliably seen with binoculars under ideal conditions.

[38] In this list, "PCFG range" refers to the area bounded by 41°N to 52°N (i.e., from survey areas NCA to NBC) and "season" refers to the period June 1 to November 30.

- Whales that use large expanses of the PCFG range in a given season.
- Whales that use small expanses of the PCFG range in a given season.
- Whales that travel in and out of the PCFG range in a given season.
- Whales that use the PCFG range but are not sighted (e.g., they occur in areas not surveyed or are otherwise missed by surveyors).

A particular whale may exhibit several of these characteristics during its lifetime. It is also likely that in any given year the assemblage of whales found in the PCFG range exhibit all of these characteristics, thereby underscoring the difficulty in deriving "true" abundance estimates for the PCFG. Nearly 20 years ago, Darling (1984) made a rough estimate that in addition to 35 to 50 whales off Vancouver Island, "[a]pproximately 75 whales summer off Oregon each year (B.R. Mate [Oregon State University], pers. comm., 1979), so it is likely there are at least 100 in the British Columbia-Washington-Oregon area." Since then, it has become possible to develop more refined estimates using mathematical models referred to as 'mark-recapture' estimators based on the photo-identification data collected annually in the range of the PCFG during June 1 to November 30. Since 1977, these data presently identify 650 gray whales that have been seen at least once in the range of the PCFG during June 1 to November 30 and assigned unique identification numbers in the Cascadia catalog. Of these, approximately half have been seen two or more times and therefore fit the definition for the PCFG (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements).

Calambokidis et al. (2004a) first proposed that it was more appropriate to use open population models than closed population models to estimate abundance of gray whales in the PCFG and OR-SVI survey areas. Because new whales are entering a given area each year (gains through immigration and recruitment) and some new whales never return (losses through emigration and death), closed population models produce biased estimates that make them less suitable for the dynamics exhibited by PCFG whales.

More recent modeling has confirmed this conclusion. Calambokidis et al. (2012) used a variety of open- and closed-population estimators to calculate the annual abundance of PCFG whales. They concluded that the traditional Lincoln-Petersen estimator based on a closed population was positively biased because of transient whales passing through each year. The bias was greatest during the early part of the time series with greater numbers of transients in 1999 to 2001 during and after the 1999 to 2000 stranding event. The other estimators attempted to cope with the transient whales to estimate the abundance of whales excluding the transients. The trends from those estimators all showed an increase from 1998. Calambokidis et al. (2012) concluded that the modified Jolly-Seber model (referred to as 'JS1') was the least biased and best estimator for the PCFG. The JS1 estimator for each year is composed of an estimate of the number of previously seen (marked) whales that remain (alive and have not permanently emigrated) in the population plus an estimate of the number of newly seen whales that are expected to return based on their estimated first-year apparent survival, which is dominated by emigration as a result of transience. In the first year of the study (e.g., 1998 in Calambokidis et al. 2012), there are no previously seen whales so the initial estimate will be biased low. With simulation and an analysis that included some data from 1996 and 1997, Laake (2012) concluded that most of the bias was in the 1998 estimate.

Table 3-7 and Figure 3-11 display the estimates from the most recent analysis (Calambokidis et al. 2014) for the PCFG (and the OR-SVI and Makah U&A areas within the PCFG range) for 1996 to 2012. The trend shows that the PCFG increased from approximately 38 animals in 1996 to over 219 animals in 2005, and has been relatively stable since 2002 with the most recent (2012) estimate being 209 animals. However, both 1996 and 1997 are likely even lower because the photographic effort was not as expansive as it was starting in 1998; thus, the increase from 1996 to 1998 is inflated. As noted previously, each year's estimate includes a mix of whales that have either been previously seen using the area or have been seen using it for the first time and are expected to return and use it again. For comparison, the most recent photo-identification data on gray whales (Calambokidis et al. 2014) in the PCFG seasonal range show that the number of uniquely identified whales sighted in a given year has ranged from 45 whales in 1996 to 208 whales in 2012.[39]

Table 3-7. Population abundance estimates for gray whales in the PCFG, OR-SVI, and Makah U&A Subareas.

Year	PCFG[40] (NCA-NBC)		OR-SVI		Makah U&A (NWA-SJF)	
	N	Nmin	N	Nmin	N	Nmin
1996	38	36	25	23	18	16
1997	80	72	42	37	32	28

[39] Calambokidis et al. periodically update their analyses via reports that use the most recent sighting data available as well as corrections (e.g., because of identification errors) to data reported in previous years' reports. For example, Calambokidis et al. (2012) reported 130 PCFG whales sighted in 1998 while Calambokidis et al. (2014) corrected that value to 132 whales.

[40] Analyses in this EIS rely on a PCFG abundance estimate of 188 whales (Nmin = 173) based on information reported in the agency's latest stock assessment report (Carretta et al. 2014).

1998	126	117	86	78	38	31
1999	147	135	83	75	37	27
2000	149	137	89	79	37	23
2001	181	170	139	125	52	42
2002	198	188	135	122	45	31
2003	210	195	164	152	52	40
2004	218	204	159	145	55	40
2005	219	198	169	157	60	50
2006	200	183	154	142	67	61
2007	194	173	165	153	67	53
2008	207	193	181	164	79	74
2009	206	189	161	150	82	74
2010	194	180	148	134	76	62
2011	197	184	143	131	74	63
2012	209	197	165	152	81	73

Source: Calambokidis et al. 2014.

N = Population size estimate; Nmin = Minimum population size estimate

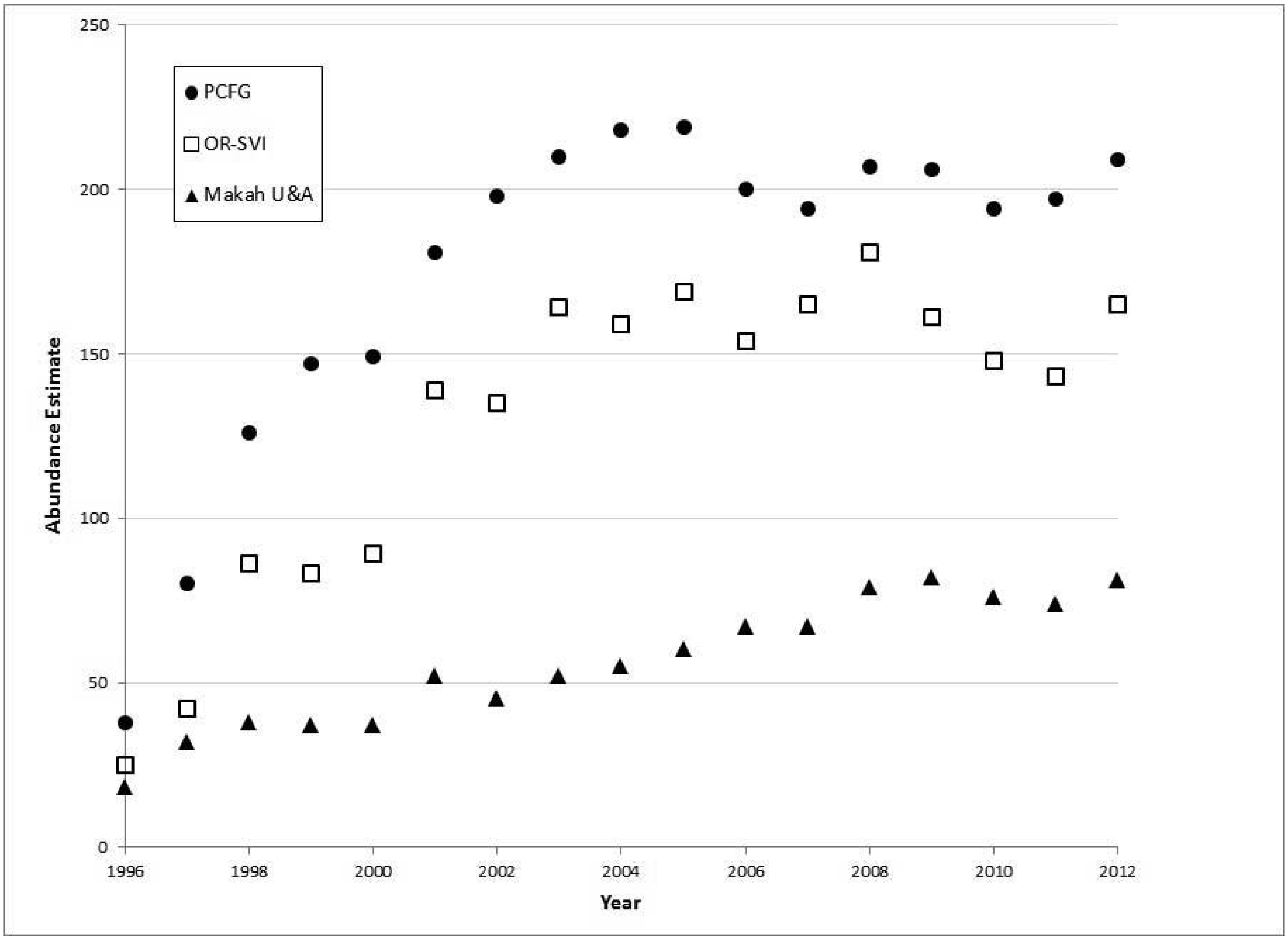

Figure 3-11. Abundance estimates for PCFG, OR-SVI, and Makah U&A whales.
NOTE: Analyses in this EIS rely on a recent abundance estimate of 188 PCFG whales based on information reported in NMFS' most recent stock assessment report (Carretta et al. 2014).

The photo-identification data analyzed by Calambokidis et al. (2014) also provide insights into the abundance of gray whales using the PCFG region and smaller areas within. This information is summarized here, and displayed in Tables 3-9 through 3-11. As noted above, during June 1 to November 30 for 1996 to 2012, 656 unique whales were seen in the PCFG range; their related sighting data is shown in Table 3-8. Approximately 67 percent (438 of the 656 whales seen) were seen within the smaller OR-SVI region (Table 3-9) and approximately 35 percent (227 of the 656 whales seen) were seen within the smaller Makah U&A region (Table 3-11). These tables also summarize the average number of whales identified in any one year, which was 146, 95, and 33 for the PCFG, OR-SVI, and Makah U&A regions, respectively. However, those numbers do not represent the total numbers of whales that use each of these areas because not all whales using a region in a year are seen, not all whales return to the same region each year, and not all of the whales return to the PCFG region each year. The annual average number of newly seen whales (excluding years prior to 1999 when the photo-identification effort expanded to cover all survey areas) was 35.4, 23.8, and 12.1 for PCFG, OR-SVI, and Makah U&A regions, respectively. The annual average number of newly seen whales that were recruited (seen in a subsequent year), excluding 1996 to 1998 and 2012, was 14.3, 11.8, and 6.1 for PCFG, OR-SVI, and Makah U&A regions, respectively. Thus, there were a substantial number of new whales seen each year and 42, 51, and 53 percent of those were seen again in a subsequent year in the PCFG, OR-SVI, and Makah U&A regions, respectively. These results are similar to those reported by Scordino et al. (2014a) for surveys in the Makah U&A where annual sightings averaged 10.8 new whales, 5.6 recruited whales, and 52.5 percent of new whales seen again in a future year.

The plots shown in Figures 3-12 and 3-13 display the cumulative number of unique whales identified by Calambokidis et al. (2014) for the PCFG, OR-SVI, and Makah U&A, respectively. The plots (typically called "discovery curves") demonstrate that the PCFG is not a completely closed population, because all of these curves continue to climb as a result of new individuals seen each year. The same pattern is true for the plots of whales that are sighted in more than one year (Figure 3-13.). These latter plots are only shown for 1998 to 2011 because whales seen in 2012 have not had a chance to be re-sighted within the scope of the data. Also, latter years will appear to increase more slowly because there have been fewer opportunities for re-sighting whales that were first seen in one of the later years (a whale first seen in 2011 has only had one year, 2012, in which to be re-sighted). Scordino et al. (2014a) analyzed data for the Makah U&A going back as far as 1984 and observed the same pattern suggesting the population is not a closed.

1 Table 3-8. Classification of whales seen within the PCFG (Northern California to Northern
2 British Columbia, June 1 – November 30).

Year	Total Seen[41]	Newly Seen[42]	Newly Seen and Seen Again[43]
1996	45	45	40
1997	69	45	36
1998	132	71	47
1999	152	69	13
2000	137	51	28
2001	173	62	26
2002	204	53	30
2003	157	20	15
2004	178	31	14
2005	138	21	11
2006	128	8	1
2007	120	20	7
2008	174	50	18
2009	154	23	6
2010	144	15	12
2011	164	19	5
2012	208	53	n/a
Total	2,477	656	309
Average[44]	145.7	35.4	14.3

3 Source: Calambokidis et al. 2014.

[41] "Total Seen" is the number of unique whales seen/identified in each year.
[42] "Newly seen" is the number of whales seen that year that had not been seen prior to that year (but within the 1996 to 2011 period).
[43] "Newly Seen and Seen Again" is the number of whales that were seen in at least one more year within the PCFG range during June 1 to November 30 subsequent to the first year they were seen.
[44] Averages for Newly Seen exclude 1996 to 1998 because photo-identification effort expanded to cover all survey areas in 1999. Averages for Newly Seen and Seen Again exclude 1996 to 1998 and 2012 for the same reason as above (as well as it not being possible to determine if whales seen in 2012 were seen in a subsequent year).

Table 3-9. Classification of whales seen within the OR-SVI (Oregon to Southern Vancouver Island) region during June 1 to November 30.

Year	Total Seen[45]	Newly Seen[46]	Newly Seen and Seen Again[47]
1996	30	30	26
1997	36	20	13
1998	86	55	37
1999	71	23	9
2000	67	24	15
2001	128	56	22
2002	103	39	28
2003	110	26	20
2004	114	29	14
2005	109	19	11
2006	98	11	3
2007	114	22	7
2008	123	22	11
2009	118	17	4
2010	92	8	7
2011	91	9	3
2012	127	28	n/a
Total	1,617	438	230
Average[48]	95.1	23.8	11.8

Source: Calambokidis et al. 2014

[45] "Total Seen" is the number of unique whales seen/identified in each year.

[46] "Newly seen" is the number of whales seen that year that had not been seen prior to that year (but within the 1996 to 2012 period).

[47] "Newly Seen and Seen Again" is the number of whales that were seen in at least one more year within the OR-SVI (from June 1 to November 30 subsequent to the first year they were seen.

[48] Averages for Newly Seen exclude 1996 to 1998 because photo-identification effort expanded to cover all survey areas in 1999. Averages for Newly Seen and Seen Again exclude 1996 to 1998 and 2012 for the same reason as above (as well as it not being possible to determine if whales seen in 2012 were seen in a subsequent year).

Table 3-10. Classification of whales seen within the Makah U&A (NWA-SJF Region) during June 1 to November 30.

Year	Total Seen[49]	Newly Seen[50]	Newly Seen and Seen Again[51]
1996	19	19	17
1997	27	15	11
1998	37	23	6
1999	11	1	0
2000	14	11	8
2001	32	19	7
2002	8	1	1
2003	22	11	6
2004	21	12	9
2005	33	11	5
2006	58	23	17
2007	20	2	2
2008	75	29	16
2009	57	13	2
2010	26	4	2
2011	41	11	4
2012	67	22	na
Total	568	227	113
Average[52]	33.4	12.1	6.1

Source: Calambokidis et al. 2014.

[49] "Total Seen" is the number of unique whales seen/identified in each year.

[50] "Newly seen" is the number of whales seen that year that had not been seen prior to that year (but within the 1996 to 2012 period).

[51] "Newly Seen and Seen Again" is the number of whales that were seen in at least one more year within the Makah U&A (NWA-SJF) range during June 1 to November 30 subsequent to the first year they were seen.

[52] Averages for Newly Seen exclude 1996 to 1998 because photo-identification effort expanded to cover all survey areas in 1999. Averages for Newly Seen and Seen Again exclude 1996 to 1998 and 2012 for the same reason as above (as well as it not being possible to determine if whales seen in 2012 were seen in a subsequent year).

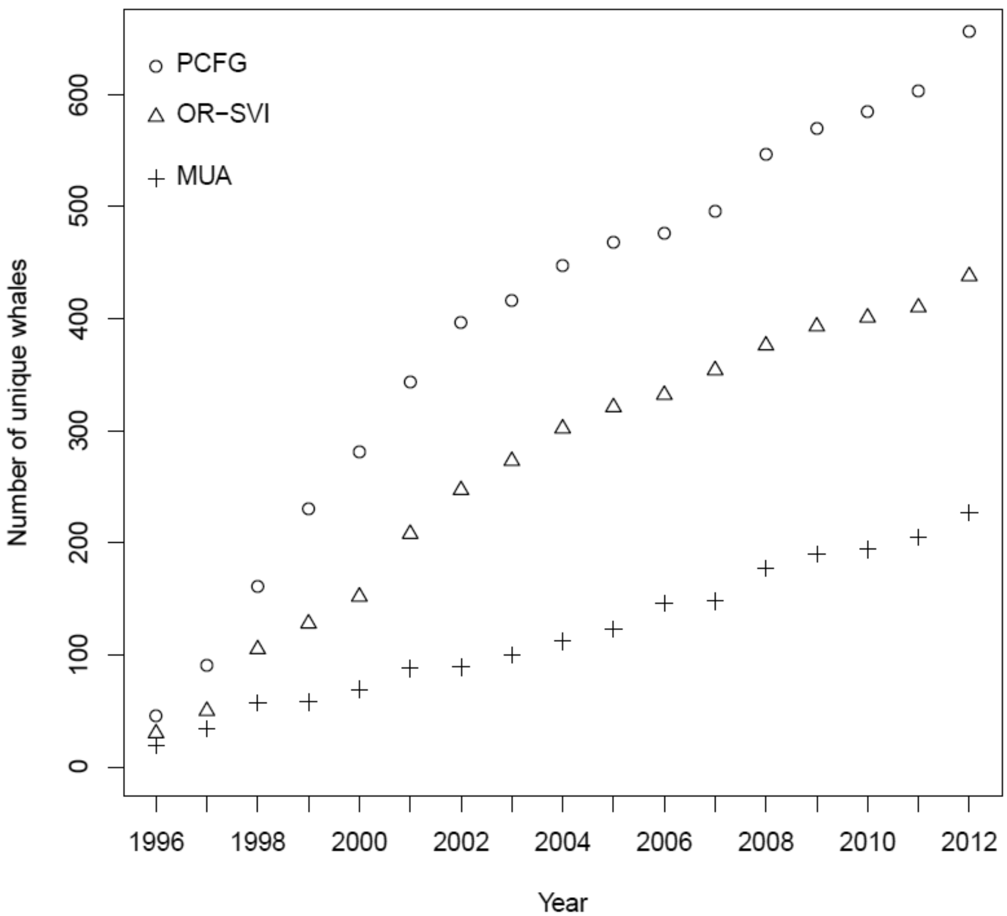

Figure 3-12. Cumulative number of unique gray whales photo-identified in the PCFG, OR-SVI, and Makah U&A regions during 1996 to 2012.

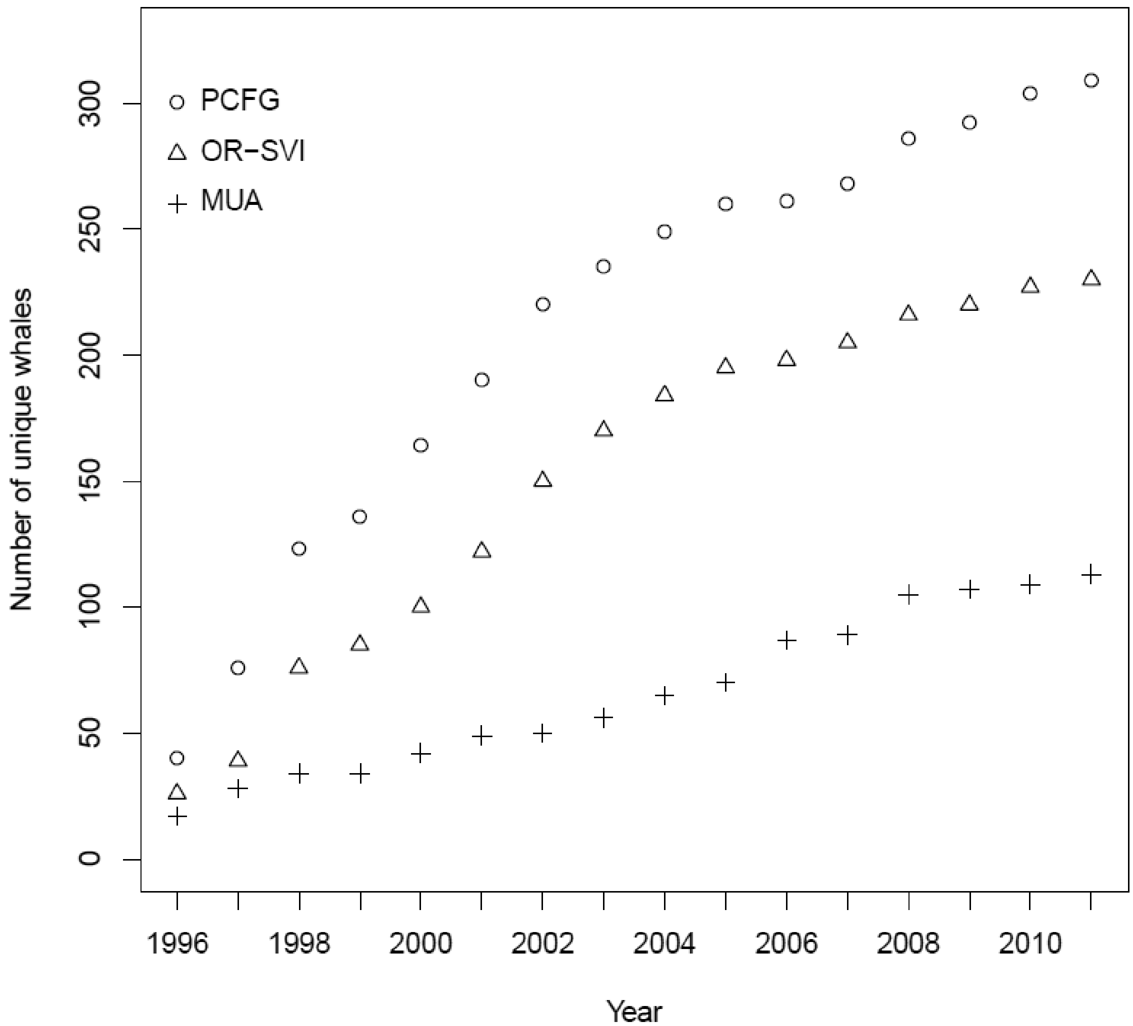

Figure 3-13. Cumulative number of unique gray whales photo-identified in the PCFG, OR-SVI, and Makah U&A regions during 1996 to 2011 and re-sighted in a subsequent year.

Estimating Numbers of Whales for Subregions Within the PCFG Range

OR-SVI. In deriving estimates of 35 to 50 gray whales for Vancouver Island and 100 whales for the Pacific Northwest, Darling (1984) defined abundance as the number of gray whales he could find in his study sites in any particular year. Calambokidis et al. (2004a) proposed that the appropriate method of estimating abundance was to consider the total number of identified whales observed in a given area, and that the area most appropriate for managing a Makah gray whale hunt was the survey areas from Oregon to Southern Vancouver Island (OR-SVI). To reach this conclusion, they focused on whales identified in the survey areas corresponding to the entire Makah U&A (the northern Washington coast and Strait of Juan de Fuca survey areas). They examined the degree to which whales sighted in these survey areas were also sighted in the OR-SVI and PCFG survey areas. They found that of the whales seen in the PCFG survey area during the 6 years of their study, 30 percent were also seen in the entire Makah U&A (northern Washington coast and Strait of Juan de Fuca survey areas). In contrast, of the whales seen in the OR-SVI survey area during the 6 years of their study, more than half were also seen in the entire Makah U&A. Based on the relatively high rate of interchange between the OR-SVI and the entire Makah U&A compared to the rate of interchange between the PCFG and the entire Makah U&A, they concluded that "it is both logical and reasonable to use OR-SVI as the region for abundance estimation in setting quotas for a harvest of whales from the [Makah U&A] region."

The Makah Tribe's application includes a provision that would limit unintentional harvests of PCFG whales using a formula based on the subset of PCFG whales that exhibit site fidelity to survey areas from Oregon to Southern Vancouver Island (OR-SVI). The basis for selecting this region was the recommendation by Calambokidis et al. (2004a) that the OR-SVI was a logical and reasonable management area for considering impacts from gray whale harvests in the Makah U&A because of the relatively high rates of whale interchange between the OR-SVI survey areas and the Makah U&A. Support for this can also be found in the report by Calambokidis et al. (2014) who analyzed sighting data for whales that had been seen on a relatively frequent basis (at least 6 different days) in the PCFG range during June 1 to November 30. Based on the observed clustering of those sightings, these researchers concluded that "it makes little sense to compute an estimate of abundance for any region that spans less than a degree of latitude" (approximately 69 miles [111 km]). The OR-SVI region spans approximately 4 degrees of latitude.

In addition to the conservative approach of basing the harvest limit on a smaller area/number of whales than the entire PCFG, the formula also relies on a *minimum* abundance estimate (rather than the higher, average number of whales). Calambokidis et al. (2014) calculated estimates for OR-SVI whales using the estimators described in Subsection 3.4.3.4.3, PCFG Abundance Trends. The JS1 estimator produced abundance estimates for OR-SVI that were expectedly lower than PCFG values but followed a trajectory very similar to that of the PCFG estimates. The OR-SVI estimates increase from approximately 25 animals in 1996 to 181 animals in 2008, with the most recent estimates being somewhat lower but stable at approximately 155 whales. Minimum population estimates are typically about 9 percent lower than the average estimates, with the most recent (2012) Nmin estimated at 152 animals. For comparison, the most recent photo-identification data on gray whales (Calambokidis et al. 2014) in the OR-SVI from June 1 to November 30 show that the number of uniquely identified whales sighted in a given year has averaged 95 and ranged from 30 (in 1996) to 128 (in 2001); the most recent number seen was 127 whales in 2012.

Makah U&A. As noted in Subsection 1.1.2, Project Location, the project area includes the Makah U&A which consists of the NWA and SJF survey areas. In *Anderson v. Evans* (2004), the court found that NMFS' previous environmental review did not adequately consider potential local effects of a Makah gray whale hunt because it did not address the number of gray whales in the area from which they would be removed (the Makah U&A). Accordingly, this EIS addresses likely effects of the alternatives on gray whales in the Tribe's U&A. Although all of the alternatives restrict hunting to the coastal portion of the Tribe's U&A (i.e., only the NWA survey area), our analyses of all of the alternatives considers whales that use both the NWA and SJF portions of the Tribe's U&A. This is because of the close proximity of the NWA and SJF, and evidence that whales using one area frequently occur in the other. Therefore, a decrease in whales using the NWA could also result in a decrease in whales using the SJF. The NWA-SJF (Makah U&A) survey area spans less than 1 degree of latitude, and Calambokidis et al. (2014) conditioned their estimates by noting that "this area is quite small relative to the observed movements of whales within the PCFG." The JS1 estimator produced estimates for the Makah U&A that were expectedly lower than PCFG and OR-SVI values and followed an increasing trajectory that was similar to, but flatter than, the trends for PCFG and OR-SVI estimates. The Makah U&A estimates increase from approximately 18 animals in 1996 to 82 animals in 2009, with the most recent estimates being somewhat lower but stable at approximately 77 whales. Minimum population estimates are typically about 18 percent lower than the average estimates, with the most recent (2012) Nmin estimated at 73 animals. For comparison, the most recent photo-identification data on gray whales (Calambokidis et al. 2014) in the Makah U&A from June 1 to November 30 show that the number of uniquely identified whales sighted in a given year has averaged 33 and ranged from 8 (in 2002) to 75 (in 2008).

3.4.3.4.4 PCFG Status, Carrying Capacity, and Related Estimates

It is difficult to compare the past and present status of the PCFG given that we know so little about these whales historically. Scordino et al. (2011b) reviewed the available literature regarding the PCFG and concluded that it is unclear whether the PCFG existed prior to the 20th century. Recently, Alter et al. (2012) conducted genetic analyses of modern and ancient gray whale bones, including archaeological samples from the Makah U&A/PCFG range. Overall, their analysis supported the hypothesis that gray whales experienced a recent and major population decline and the possibility that there was population substructure in the past in the vicinity of the Olympic Peninsula and Vancouver Island. However, these authors noted that it was premature to draw firm conclusions about such structure given the small sample sizes and small differences observed.

During the past century, the ENP gray whale population—including the PCFG— has rebounded from as few as 1,500 animals (Butterworth et al. 2002) to nearly 20,000 whales today, and was formally removed from the federal ESA list of endangered and threatened wildlife in 1994 (59 Fed. Reg. 21094, June 16, 1994). In 2010, WDFW was petitioned to list the "Eastern North Pacific – Southern Group" of gray whales as endangered under Washington Administrative Code 232-12-297 (WAC). WDFW subsequently denied the petition, noting that gray whales are presently listed by the state as a sensitive species, but that the WAC does not allow for listing populations or subpopulations of species or subspecies (Anderson 2010).

Currently, the IWC has concluded that it is plausible that the PCFG is a demographically distinct feeding group (IWC 2010a) and has assessed the potential harvest-related impacts on this group of whales from the Tribe's proposed hunt (refer to IWC Implementation Review of PCFG Gray Whales, below)[53]. Similarly, we have determined that the PCFG may warrant consideration as a distinct stock in the future, and in our most recent stock assessment report calculated a separate PBR level for the PCFG to assess whether levels of human-caused mortality are likely to cause local depletion of this group (Caretta et al. 2014). This calculation used a minimum population size (Nmin) of 173 animals, times one half the maximum theoretical net population growth rate (Rmax; ½ x 6.2 percent = 3.1 percent), times a recovery factor of 0.5, resulting in a PBR of 2.7 animals per year (Carretta et al. 2014) (Table 3-11). Further, estimates of human-caused mortality in the PCFG between 2007 and 2011 averaged 0.45 whales killed per year (Carretta et al. 2014). Applying the same recovery factor and Rmax value, but using the most recent Nmin estimate of 197 animals (Calambokidis et al. 2014), yields a similar PBR of 3.1 animals per year.

Punt and Moore (2013) attempted to determine the OSP level for the PCFG using an existing population dynamics model employed by the IWC. After running 13 model variants, they concluded that "it was not possible to draw a definitive conclusion as to whether the PCFG is within OSP." They noted that the equivocal outcome of their analysis largely stems from the relatively flat, stable abundance data available for the PCFG. One possible explanation for their finding is that the PCFG is at or near its carrying capacity and thus above MNPL and within OSP. However, it is also possible, given different potential rates of intrinsic population growth, that the PCFG area could support more whales and that current numbers are regulated by a combination

[53] Although the IWC has not formally identified the PCFG as a stock, the Scientific Committee (IWC 2012a) noted that its Implementation Review of eastern North Pacific gray whales (with an emphasis on the PCFG) was "based on treating PCFG as a separate management stock" (which may not be equivalent to a stock as defined under the MMPA).

of bycatch mortality and emigration that offsets immigration and internal production (recruitment of calves born to known PCFG females). Punt and Moore (2013) suggested that obtaining better estimates of a number of model parameters could potentially improve inference about the likelihood of the PCFG being within OSP.

IWC Implementation Review of PCFG Gray Whales

Subsection 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates—IWC Implementation Review of ENP Gray Whales, provides an overview of the IWC's goals, objectives, and process for conducting an Implementation Review (i.e., a periodic evaluation of catch limits) for ENP gray whales, of which the PCFG are a part.

Over a decade ago during the IWC's development of a gray whale SLA, there had been discussion of stock structure at several meetings. While the possibility of a summer feeding aggregation along the Pacific coast between California and southeast Alaska was discussed, in 2000 the Scientific Committee had agreed that a single ENP stock scenario was the most appropriate (IWC 2001). In 2010, the Committee was presented with recent genetic (Frasier et al. 2010), photo-identification (Calambokidis et al. 2010), and telemetry studies (Mate et al. 2010) and reached the conclusion that "[d]espite some differences in interpretation and recognizing that further analyses could be carried out, the [Standing Working Group] agreed that the hypothesis of demographically distinct southern feeding group [PCFG] is plausible and warranted further investigation" (IWC 2010a). As part of that 2010 annual meeting (IWC 2011a), the Committee also determined that the just-completed 2010 Implementation Review had shown that the ENP population as a whole was in a healthy state and that the gray whale SLA could continue to be used to provide advice on the Russian (Chukotkan) hunt (refer to Subsection 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates—IWC Implementation Review of ENP Gray Whales). It further concluded that information reviewed on possible stock structure and the Makah hunt proposal warranted a new Implementation Review to evaluate the performance of gray whale SLAs with a primary focus on the PCFG. That new review included various analyses and intersessional meetings in 2011 and 2012 wherein IWC scientists focused on building and evaluating an operating model and its associated trial structure.

At its 2012 meeting, the Committee announced that it had completed its new Implementation Review that evaluated several variants of the proposed Makah hunt (IWC 2012e). These variants differed in the way that they handled bycatch of PCFG whales. Some variants relied on an

Allowable PCFG Limit (APL)[54] using the formula proposed by the Tribe in its application to NMFS (Makah Tribe 2005), others incorporated a fixed bycatch limit, and others explored the impact of having no limit on bycatch of PCFG whales (the hunt is only stopped if the total strike limit is reached, or the number of struck-and-lost animals reaches its limit, or the landing limit is reached).[55] The trials tested within these variants were based on three hypotheses: 1) Hypothesis P (Pulse) assumes that there is no bias in the PCFG abundance estimates (but dropping the first year of estimates in 1998 and that a pulse of immigration occurred in 1999 and 2000); 2) Hypothesis B (Bias) assumes a strong time-varying bias (dropping to zero in 2002) in the abundance estimate but no pulse of immigration; and 3) Hypothesis I (Intermediate) includes a moderate time-varying bias in the abundance estimates and a pulse of 10 immigrants into the PCFG in both 1999 and 2000. These hypotheses were evaluated to account for difficulties in producing simulated abundance trajectories that fit the abundance estimates without incorporating a pulse or a survey bias into their model. For these trials, the IWC Scientific Committee agreed, based on the analysis by Laake (2011), that a reasonable estimate of annual immigration was up to six animals (IWC 2012a; IWC 2012e). The Committee also included a robustness trial in which the future catch was strongly female biased (0.2 males:0.8 females).

The Committee noted that weather conditions and the availability of whales would make it likely that most hunting would occur in May, but that data were insufficient to assess the number of strikes by month. Therefore, it was not possible to make a reliable estimate of the proportion of struck-and-lost whales that would count towards the APL. Given this uncertainty about how the planned hunt would respond to failing to take into account struck-and-lost PCFG whales, the Tribe had proposed two SLA variants spanning the options as to when the hunt might occur:

- SLA variant 1: struck-and-lost whales do not count towards the APL; i.e., there is no management response to PCFG whales that are struck but not landed. This variant corresponds to the proposed hunt occurring entirely during December through April.

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[54] The APL is synonymous with the Allowable Bycatch Limit (ABL) proposed by the Tribe.

[55] The variants also differed from the Tribe's waiver application by including a presumption that some struck and lost whales would be PCFG whales. This condition was added for purposes of the Implementation Review modeling and articulated as follows: "A whale that is struck and lost between May 1 and May 31 will be presumed to be a member of the PCFG and will count toward the ABL for that calendar year unless photographs of the whale, when compared with the NMML-funded photo-identification catalogue maintained by Cascadia Research Collective, demonstrate that it is not a member of the PCFG" (IWC 2012e).

- SLA variant 2: all struck-and-lost whales count towards the APL irrespective of hunting month; i.e., the number of whales counted towards the APL may exceed the actual number of PCFG whales struck because some animals may not actually have been PCFG whales.

The Committee noted that SLA variants 1 and 2 were potentially satisfactory and performed well in nearly all 72 Evaluation Trials, and SLA variants 1 and 2 performed acceptably for all Robustness Trials. Variant 2 performed acceptably for all trials while Variant 1 performed acceptably for all trials except one, where it was deemed to have marginal performance. That trial assumes that the relative probability of harvesting a PCFG whale during December through May is double the observed proportion of PCFG whales in the available photo-identification studies during the corresponding time period. Specifically, the Committee stated that:

> "(1) SLA variant 2 performed acceptably and met the Commission's conservation objectives for conservation while allowing limited hunting;
>
> (2) SLA variant 1 performed acceptably for nearly all the trials and could be considered to meet the Commission's conservation objectives provided that it is accompanied by a photo-identification programme to monitor the relative probability of harvesting PCFG whales in the Makah U&A, and the results presented to the Scientific Committee for evaluation each year.
>
> The Committee endorses these conclusions and commends them to the Commission. It also agrees that the Implementation Review is completed."

The Committee also noted that while the SLA variants performed adequately for the trials in which the sex ratio of future catches is female-biased (0.2:0.8), the sex ratio of the hunt should be monitored and considered in future Implementation Reviews.

The IWC trials produce final statistics related to conservation status and catches, in particular an output termed the "final depletion level" which is defined by the IWC as the final population level as a percent of K.[56] For example, a trial that yields a final depletion level less than 0.6 (that

[56] Weller et al. (2013) note that this is related to, but can be slightly different from, the MMPA definition of "depletion," which is defined to be a population level below the Maximum Net Productivity Level (MNPL). In determining whether a stock is depleted under the MMPA, MNPL is generally assumed to either be a range from 50 to 70 percent of K, or a single value such as 50 percent or 60 percent of K. The only practical difference occurs when a range is used in MMPA determinations, where one calculates the

is, 60 percent of K) would be worrisome and not in accord with IWC conservation objectives. The Committee noted the poor performance/excessive depletion of some trials that included an assumption of low (1 to 2 percent) Maximum Sustainable Yield Rates (MSYR). However, they noted that such low rates were probably unrealistic given the evidence that the ENP population as a whole had recovered from severe historical depletion as a result of whaling and more recently rebounded from the 1999 to 2000 unusual mortality event. Therefore, the Committee concluded that the relatively poor results from these low-MSYR trials was not a reason to preclude the conclusion that both SLA variants had overall satisfactory conservation performance. In the course of testing trials, the modeling conducted to assess SLAs generates thousands of estimates of K. The range of Ks fell between 161 and 1,000 animals and members of the SWG considered these values to be plausible for the sake of trial testing (A. Punt, Director, School of Aquatic and Fishery Science, University of Washington, pers. comm., May 15, 2013). However, the goal was not to pinpoint a specific value for K but instead to test a range of possible Ks (and numerous other parameters) to see how the final depletion levels were affected. Trial results that yielded depletion levels below 60 percent of a randomly chosen K estimate would be viewed as not meeting the IWC's conservation objectives.

Although these two variants were deemed acceptable, the Committee also noted that they did not correspond exactly to the hunt proposal submitted by the Makah Tribe to the IWC and expressed concern that the actual conservation outcome of the proposed hunt was not tested. Essentially, the aspect of the proposed hunt that had not been evaluated was the interaction between the actual number of strikes-per-month during the hunting season (December through May), and the assumption of whether a struck and lost whale belongs to the PCFG. The Committee agreed that the Standing Working Group of the AWMP should develop and test an exact variant intersessionally, in order to evaluate the results at the 2013 Annual Meeting.[57]

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probability a population is below MNPL over a range of percentages of K. If a single value is used for MNPL (e.g., 60 percent), then the IWC final depletion level is identical.

[57] Also, the IWC analysis used a 2010 OR-SVI minimum population estimate (Nmin) of 143 whales (as reported by Laake in the IWC 2012 AWMP Workshop Report), a recovery factor of 1.0, and a maximum net productivity rate (Rmax) of 4 percent. The Nmin estimate for OR-SVI whales is expected to vary (the current estimate is 152 anuimals[Calambokidis et al. 2014]), while values for Rmax and the recovery factor are fixed based on information submitted by the Makah Tribe to the IWC during the 2012 workshop focusing on PCFG gray whale Implementation Review. The 4 percent Rmax value used in that review was lower than the 4.7 percent used in the Tribe's application. We reviewed the differing values with the Tribe and determined that Alternative 2 (the Tribe's proposal) should be assessed using an Rmax of 4 percent in keeping with the analysis and findings of the IWC's Scientific Committee.

To address this issue, Brandon and Scordino (2012) submitted additional variants for testing that represented logical bounds on variants 1 and 2. Because there is no reliable way to predict the exact number (or model the probability) of strikes that may occur during a given month, they instead proposed to evaluate six additional variants representing each possible outcome of the number of strikes by month:

A. Allow only one strike prior to May.
B. Allow two strikes prior to May.
C. Allow three strikes prior to May.
D. Allow four strikes prior to May.
E. Allow five strikes prior to May.
F. Allow six strikes prior to May.

At a December 2012 intersessional workshop (IWC 2012f), participants endorsed the testing of these new variants. After reviewing the results of these tests, the Scientific Committee noted that none of the new final depletion levels fell outside the bounds of those previously reviewed by the Committee and agreed that the proposed Makah hunt had been fully examined within the SLA framework (IWC 2013a). Moreover, the Committee confirmed that the proposed management plan meets the IWC conservation objectives provided that if struck-and-lost whales are not proposed to be counted toward the APL, then a photo-identification research program to monitor the relative probability of harvesting PCFG whales in the Makah U&A is undertaken each year and the results presented to the Scientific Committee for evaluation. In other words, only variant 2 meets the Commission’s conservation objectives without the research requirement. The Committee also noted that work is underway to further support such a research program via a photo-identification catalog managed by NMML.

Table 3-11. Various population estimates and limits for WNP, ENP, and PCFG gray whales.

Parameter	**WNP Stock**	**ENP Stock**	**PCFG**
Recent Abundance	140 whales (Cooke et al. 2013)	20,990 whales (Durban et al. 2013)	188 whales (Carretta et al. 2014)
Minimum Population Estimate (N_{min})	135 whales (Cooke et al. 2013)	20,227 whales (Durban, J., NMFS Population Ecologist, pers. comm., September 19, 2013)	173 whales (Carretta et al. 2014)
Recent Trend	Increasing at 3.3 percent per year (Cooke et al. 2013)	Stable, close to or at carrying capacity (Carretta et al. 2014)	Stable (Carretta et al. 2014)
Recruitment	Average of 6 calves/year for 1997-2012; calf production index for 2012 = 3.2 percent (Burdin et al. 2012)	Calf production indices for 1994-2012 range between 1.3-8.8 percent (Carretta et al. 2014)	Average of 12.5 non-calf whales previously-seen-and-seen-again/year [range 1-28] + 3.9 calves seen/year [range 0-12] (Calambokidis et al. 2014)
Within OSP?	Not assessed (stock is listed as depleted under the MMPA)	Yes, at 91 percent of K and an 88.4 percent chance of being above MNPL (Punt and Wade 2012)	Unknown (Punt and Moore 2013)
Recovery Factor (F_R)	0.1 (Moore and Weller 2013)	1.0 (Caretta et al. 2014)	0.5 (Caretta et al. 2014)
Maximum Net Productivity Rate (R_{MAX})	0.062 (Moore and Weller 2013)	0.062 (Carretta et al. 2014)	0.062 (Carretta et al. 2014)
Potential Biological Removal Level (PBR)	0.10 to 0.57 whales/year (Moore and Weller 2013)	559 whales/year (Carretta et al. 2014)	2.7 whales/year (Carretta et al. 2014)
IWC Catch Limits (2013-2018)	n/a	Up to 140 whales/year (720 max over 6 years) (IWC 2012b; Ilyashenko & Wulff 2013,2014)	n/a
Human-caused Mortality and Serious Injury – Minimum Estimates			
Recent Subsistence/Native Harvest	Unknown; not targeted by native hunters	123 whales/year by Chukotkan hunters[58] [range 115-129 whales/year from 2006-2010] (IWC Annual Reports)	0.2 whales/year [1 whale illegally killed by Makah hunters in 2007] (Carretta et al. 2014)
Commercial Fisheries	Unknown; 28 of 150 photo-identified whales had entanglement-related scars (Bradford et al. 2009)	2.45 whales/year (Carretta et al. 2014)	0.15 whales/year (Carretta et al. 2014)
Ship Strikes	Unknown; 3 of 150 photo-identified whales had collision-related scars (Bradford et al. 2009)	2.2 whales/year (Carretta et al. 2014)	0.1 whales/year (Carretta et al. 2014)
Total	***Unknown***	***127 whales/year***	***0.45 whales/year***

[58] All whales killed by Chukotkan hunters are assumed to be from the ENP stock.

3.4.3.5 Welfare of Individual Whales

The MMPA and WCA provisions discussed in Subsection 3.4.2, Regulatory Overview, describe considerations relevant to the welfare of individual whales in an aboriginal subsistence hunt. Any permit issued by NMFS under the MMPA must include a finding that the taking is humane, defined as inflicting the least possible degree of pain and suffering practicable (16 USC 1362(4); 50 CFR 216.3). The IWC has focused on reducing the length of time to death of a whale (i.e., reducing the amount of time between the strike and the death of a whale) to improve the humaneness of whaling (IWC 2004c; IWC 2007a; IWC 2012g). The IWC definition of humane killing is "[d]eath brought about without pain, stress, or distress perceptible to the animal. . . . Any humane killing technique aims first to render an animal insensitive to pain as swiftly as technically possible. In practice this cannot be instantaneous in a scientific sense" (IWC Resolution 2004-3). Aboriginal subsistence whalers are urged to do everything possible to reduce any avoidable suffering caused to whales in hunts (IWC Resolution 1997-1), and governments are encouraged to provide appropriate technical assistance (IWC Resolution 1999-1). The IWC criteria for determining the time to death and insensibility in hunted whales in the field are as follows: 1) relaxed lower jaw, 2) no flipper movement, or 3) sinking without active movement.

Pain has been defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (International Association for the Study of Pain 1979). Researchers have proposed assessing pain in animals by measuring physiological changes (such as pulse rate, blood pressure, or blood cortisol levels, etc.) and behavioral indicators (such as vocalization, avoidance, shaking, etc.) (Keefe et al. 1991).

Any hunting under the WCA must not be conducted in a wasteful manner. Two issues relevant to humaneness are also relevant to wastefulness: killing only as many whales as are needed for subsistence and subsistence uses (50 CFR 216.3), and ensuring that hunters quickly kill and land struck whales, rather than striking and losing them. The concept of waste includes issues beyond welfare of individual whales, such as ensuring that hunters quickly tow killed whales to shore and butcher them rapidly to avoid spoilage.

3.4.3.5.1 Review of Hunting Methods

The method of the hunt includes total whaling operations and practices, including vessels and weapons. Primary weapons are those used initially to strike and secure the whale. Some primary weapons are also capable of killing the whale. If the primary weapon does not also kill the whale, a secondary weapon is used. The secondary weapon may be the same as the primary weapon, but used additional times. Hunting weapons are also discussed in conjunction with public safety in

Subsection 3.15.3.5.2, Weapons Associated with the Hunt. This section discusses weapons in conjunction with the welfare of individual whales.

The Makah Tribe's proposed action includes hunting whales using a traditional wood canoe (with harpooner and crew) accompanied by a motorized chase boat (with a rifleman and an observer), with one of these vessels also carrying the whaling captain. Because the maximum speed of a gray whale may exceed that of a paddled canoe, the Makah whalers must stealthily approach a whale by either approaching a slow moving whale quietly or positioning their canoe in the expected path of a surfacing whale. This EIS also examines an alternative of an all-motorized hunt, in which the Makah hunters who are striking the whale are also in a motorized vessel instead of a traditional wood canoe. In either event, after a Makah hunter struck a whale with the hand-thrown toggle point harpoon attached to a line and floats, a rifleman in the chase vessel would kill the whale by using a .50 caliber or larger rifle aimed at the central nervous system (Subsection 3.15.3.5.2, Weapons Associated with the Hunt).

This EIS examines alternative weapons for hunting gray whales by Makah subsistence hunters. These include the use of a hand-thrown darting gun as the primary weapon for striking whales and explosive projectiles delivered by either a second darting gun or a shoulder gun as the secondary weapon for killing whales (and it may be desirable to attach additional floats using a toggle-point harpoon to keep a struck whale from sinking). Both the weapons proposed by the Makah Tribe and the alternative weapons examined are used in other subsistence whale hunts, as well as in commercial hunts.[59] Information from these hunts may be relevant to assessing the impacts of the proposed weapons on the welfare of individual whales compared to alternative weapons.

Alaska Eskimos hunt bowhead whales in the Bering, Chukchi, and Beaufort Seas using hand-thrown darting guns as their primary weapons to strike whales, securing them with lines and floats. The darting gun delivers an explosive grenade, which may also kill the whale. The secondary weapon in this hunt is also an explosive grenade, delivered either by another hand-thrown darting gun or a shoulder gun. The darting gun can deliver either a black powder or a penthrite projectile, the latter being preferred because black powder can taint the taste of the whale meat (Associated Press 2005). Although the penthrite grenades are expensive and some hunters are reluctant to use them, the chairperson of the Alaska Eskimo Whaling Commission

[59] A recent report from an IWC workshop on euthanasia protocols (IWC 2014e) recommended high-caliber ballistics and explosives for baleen whales.

(AEWC) has most recently reported that their use and success is increasing (IWC 2011d; IWC 2012h).

Aboriginal subsistence hunters (Chukotka Natives) in Russia hunt gray whales using hand-thrown toggle-point harpoons to strike whales and either smaller caliber rifles (for whales up to 33 feet [10 m]), hand-thrown darting guns (for whales over 33 feet [10 m]), or both to kill whales (IWC 2007a). (The use of larger caliber weapons by civilian personnel was prohibited in the Russian Federation under national legislation [IWC 1997]). Chukotka Natives have experience with penthrite grenades, but their use is not widespread.

Aboriginal subsistence hunters in West Greenland use deck-mounted harpoon cannons that also deliver penthrite grenades as the weapon for both striking and killing fin whales (Greenland Home Rule Government and Greenland Hunter's Organization 2006; IWC 2007a). They also use this weapon for striking minke whales. If the whale is not killed by the first strike, they use a high caliber rifle as the killing weapon (either a 7.62 mm with full metal jacket bullets, or a .375 caliber rifle with round-nosed bullets). In east and west Greenland north of Disko Bay, a collective subsistence hunt occurs for minke whales in which the hunters use hand-thrown harpoons (without explosive charges) to strike the whales and a 7.62 mm or .375 caliber rifle as the killing weapon.

Commercial hunters in Norway use deck-mounted harpoon guns that also deliver penthrite grenades as the primary weapon for striking minke whales (Øen 2006; IWC 2007a). If the penthrite grenade does not kill the whales, hunters use rifles as a backup (secondary) killing method, including 9.3 mm, and .375 and .458 caliber rifles with full metal jacket bullets or round-nosed ammunition. The deck-mounted cannons used in the Greenland and Norwegian hunts are not comparable to the two methods examined in this EIS (the darting gun and shoulder gun). Information about the use of rifles as secondary killing weapons in these hunts, however, may be relevant to analyzing impacts of the Makah Tribe's proposed killing weapon.

3.4.3.5.2 Whale Response to Being Pursued

The Makah Tribe's proposed action includes approaching and pursuing whales using a combination of traditional and modern methods, including the use of canoes accompanied by one or more chase boats with an outboard motor (Subsection 2.3.2, Alternative 2, Tribe's Proposed Action). In addition, this EIS also examines the alternative of an all-motorized hunt, with no canoe. Based on its experience during the 1999 to 2000 hunts, the Tribe's proposal estimates there could be approximately 10 approaches and 4 unsuccessful harpoon attempts for every whale struck. An unsuccessful harpoon attempt means the whale would not be struck (that is, would not have a harpoon embedded and would not show evidence of potentially lethal injury). The Tribe also estimates that the number of whales subject to approaches with no harpoon attempts in any calendar year would not exceed 140.

At the 2003 IWC Workshop on Whale Killing Methods, the United Kingdom presented a paper raising concerns that whales experience stress as a result of being pursued and can exhibit stress-related symptoms such as impaired immune defense, reduced fecundity, failure to grow, and a disease called exertional myopathy (IWC 2004c). This has not been documented in gray whales, and there are no data at present to evaluate what level of activities would be required to induce this in gray whales. The response of gray whales to pursuit from whale-watching vessels (and vessel presence in general, such as those accompanying any potential whale hunt) is discussed in Subsection 3.4.3.6.6, Vessel Interactions. No data are available specifically regarding the response of gray whales to non-motorized vessels (i.e., human-powered vessels such as kayaks), but non-motorized vessels generally are addressed, along with motorized vessels, in whale-watching guidelines and regulations globally (Carlson 2004).

During the unauthorized hunt in 2007, the Makah Tribe's biologist reported on the distribution and behavior of gray whales that had been sighted in the vicinity of the whale that had been harpooned, shot, and eventually killed (Scordino 2007b). Anecdotal reports noted that other gray whales could be seen spouting in the area during the hunt and seemed unaffected by the hunt and Coast Guard and fishing boats in the area. Three days after the hunt, the biologist sighted two gray whales within 0.6 miles (1 km) of where the killed whale had been harpooned, and noted that these whales exhibited "normal feeding behaviors and showed no escape behavior or agitation when approached by the vessel for photographs."

3.4.3.5.3 Whale Response to Being Struck

It has been reported since at least the 1800s that gray whales (also called 'devil fish') could be dangerous prey when hunted, commonly crashing into whaling boats with their heads (Henderson 1984) (refer to Subsection 3.15.3.3 Behavior of the Gray Whale). During the Chukotkan gray whale hunt of 2007, the Russian Federation reported that of the 129 whales harvested 49 animals (39 percent) "were highly aggressive, and threatened or even attacked hunting boats, so it could definitely be said that every third whale was dangerous for whalers" (IWC 2007b). Subsequent reports from this hunt continue to cite such aggressive behaviors in 32 to 42 percent of gray whales taken (IWC 2009a; 2010b; 2012i).

Under the Makah proposal, the harpooner would strike the whale with a stainless steel toggle-point harpoon with a line and floats attached (for the definition of and evidence for a strike, refer to Subsection 2.3.2.2, Gray Whale Hunt Details). The harpoon point is intended to penetrate the whale's skin (blubber), toggle open, and secure the whale. The harpoon can penetrate and successfully secure the whale in numerous locations on the whale's body, although harpoons may dislodge from whales. Whether the harpoon holds or dislodges depends on, among other factors, the force at impact, the angle of the strike, and the surface characteristics (hard underlying connective tissue, barnacles, etc.). Hunters will often use additional harpoons to attach floats to keep the whale afloat. During the 1999 hunt, Makah whalers struck the whale with three harpoons, the third of which was thrown moments after the rifle shot that rendered the whale motionless (Gosho 1999). Whale responses to being struck with a toggle-point harpoon may include increased swimming speed, diving (Øen 1995), thrashing, and ramming boats (Henderson 1984). A harpoon damages only the organ it hits, and its impact is likely too low to damage the central nervous system (Knudsen and Øen 2003); thus, it may not immediately cause the whale's death. However, whales may subsequently die as a result of a harpoon strike (Angliss and Lodge 2002).

This EIS examines the use of a hand-thrown darting gun as an alternative method of striking and securing whales (Subsection 3.15.3.5.2, Weapons Associated with the Hunt). The darting gun delivers an explosive grenade that detonates inside the whale and kills via shock waves and shrapnel. A grenade delivered by a hand-thrown darting gun may kill the whale, but a secondary method of killing is often required (Øen 1995; O'Hara et al. 1999). Hand-thrown darting guns are aimed at the cervical (neck) and thoracic (chest) region, rather than the head, as the skull is not easily penetrated by the grenade (Butterworth and Brakes 2006; IWC 2007a). Whale responses to being struck with a grenade from a hand-thrown darting gun include death, insensibility, and stunning (Knudsen and Øen 2003), as well as diving (Øen 1995), thrashing, and ramming boats (Bockstoce 1986).

Øen (2006) reported on improvements to hunting and killing methods for minke whales in Norway, in particular, refinements of the penthrite grenade. He noted that the instantaneous death rate in these hunts had increased from 17 percent in 1981 to 1983 to 80 percent in 2000 to 2002 in large part because of improved grenades and hunter training. Data regarding the number of bullets or harpoons used to kill whales do not necessarily indicate the proportion of whales killed by the first strike as hunters are encouraged to re-shoot whales if there is any doubt the whale is still alive (Knudsen 2005; IWC 2007a). In the Alaska Eskimo bowhead whale hunt, Øen (1995) reported that the shoulder gun is used almost routinely after the darting gun has been fired. The Alaska Eskimo data reported to the IWC do not include the number of whales killed by the first strike, possibly because of this routine firing of additional grenades and because of the difficulty in determining whether a struck whale is dead (IWC 2004c). Øen (1995) conducted field studies with penthrite grenades in the Alaska bowhead hunt in 1988 and reported that seven of the eight whales struck with penthrite grenades died from the first grenade thrown; the eighth whale required three grenades. More recently, the U.S. reported to the IWC that most of the Alaskan villages now have access to the new penthrite grenades and that these often result in instant kills (IWC 2011d). The Russian data reported to the IWC also do not include the proportion of whales killed by the first strike from a darting gun. The data from the Greenland and Norwegian hunts, which use large vessels and deck-mounted harpoon guns and cannons, cannot be readily compared to the Makah (or Alaska Eskimo) hunts, which use small vessels and light weapons.

3.4.3.5.4 Method of Killing and Time to Death

Rifle as the Killing Weapon

Hunters killing a whale with a rifle aim for the whale's central nervous system (especially the brain), with the intent of causing immediate death or unconsciousness (Knudsen and Øen 2003). The accuracy of the first shot is important for the following reason:

> [H]unting with rifle or shotguns involves an inevitable risk of only wounding the animal, as the projectiles are fired from a distance and the animals often present a moving target. The area of impact of the first round will always be decisive with regard to how quickly the animal collapses and dies (Knudsen 2005).

The Makah propose to use a .50 caliber rifle to kill any whale struck and secured with the toggle-point harpoon. In 1999, shots from a larger .577 caliber rifle used by the Tribe produced a time to death of 8 minutes from the time the harpoon struck the whale until the final rifle shot rendered the whale motionless (Gosho 1999)[60]. Gosho (1999) reported that the killed gray whale was a female approximately 30.5 feet (9.3 m) in length. The necropsy performed after the hunt indicated that the first shot that entered the whale hit the skull and stunned it, while the second shot that entered the whale penetrated its brain and likely killed it instantly (Gosho 1999; IWC 2004c). During the unauthorized hunt in 2007, at least 16 shots struck that whale and it took approximately 9 hours to die (Scordino 2007a,b). It is not known what caliber rifle was used to shoot the whale, which was estimated to be about 40 feet (12.2 m) long (Mapes 2007), but the

[60] A total of four rifle shots were fired over the span of five minutes; the first two shots either missed or were ineffective but the final two shots hit near the blowhole.

Makah marine biologist reported that the hunters were in possession of both a .460 and a .577 rifle. He also noted that the whale would have died much sooner if—in addition to other factors[61]—the primary rifle (.577) had not been lost overboard (Scordino 2007a,b).

Three separate reports (Ingling 1999; Beattie 2001; Graves et al. 2004) examined past Makah proposals and concluded that a .50 caliber rifle (or greater) is the appropriate caliber of rifle to use, after testing it alongside smaller caliber weapons. Ingling (1999) concluded that for large game, larger bullets are more effective in producing penetration deep enough to reach a vital organ or disabling site in the animal and thus require more power (i.e., heavier guns). In addition, rifles that are at least .50 caliber provide a better margin of error in targeting compared to smaller caliber rifles. Graves et al. (2004) concluded that the .50 caliber rifle was the best weapon choice and added that "small caliber rifles simply will not do the job" of quickly dispatching whales with large size and thick bones.

Graves et al. (2004) recommended that Makah hunters use a .50 caliber cartridge with an Arizona Ammunition Match grade 750-grain bullet, noting that it is one of the most common cartridges used in .50 caliber competitions and by specialized units of the U.S. Government. They computed that the maximum range[62] for this cartridge is 4.97 miles (8 km), a distance similar to that reported in the U.S. Army field manual for the .50 BMG (4.23 miles/7.44 km) and other reports citing maximum ranges from 4.04 to 5.0 miles (6.50 to 7.40 km) (U.S. House of Representatives 1999; Kline 2001; Barrett Firearms 2011; McRae, C.K., U.S. Army, pers. Comm. April 10, 2013). For comparison, the .577's lower ballistic coefficient (i.e., relative ability to overcome air resistance) and greater rate of drop would be expected to result in a shorter range than that calculated for the .50 caliber cartridge recommended by Graves et al. (2004).

Although the .577 caliber rifle used in the 1999 hunt was effective at quickly killing an adult gray whale, Graves et al. (2004) and Graves and Hazelton (2004) rejected this rifle because of the

[61] Other reasons contributing to the whale's prolonged death likely included insufficient ammunition; inadequate hunter training; poor shot placement; slow communication time between U.S. and tribal officials; and the Coast Guard's rapid response time and curtailment of the unauthorized hunt (Scordino 2007a, 2007b).

[62] The maximum range is the greatest possible distance that a bullet can reach, assuming the rifle is held at an optimum elevation angle and accounting for environmental variables (e.g., sea-level conditions, temperature, etc.). However, the Makah's proposal cites public safety measures that would authorize the discharge of firearms when whaling only when the shooter 1) was within 30 feet (9.1 m) of the target area of a whale; 2) had a field of view that was clear of all persons, vessels, and other objects that could result in injury or loss of human life; and 3) had a minimum visibility of 500 yards (457.2 m) in any direction.

difficulty of obtaining ammunition. It is unclear if the .577 rifle lost during the illegal hunt in 2007 can be replaced, as well as whether suitable ammunition will be produced in the future (i.e., the manufacturer went out of business but was recently acquired by new owners) (Graves and Hazelton 2004; Broadsword Group 2013). Therefore, it is most likely that the Makah hunters will use the recommended .50 caliber weapon, but it is possible that a larger caliber weapon will be used.

In a more recent review, Dr. Allan Ingling noted that the whale hunting rifles are probably the single most important items on which the success or failure of the hunt depends and underscored that rifles must be tested for their effectiveness before they are used in a hunt (A. Ingling, Doctor of Veterinary Medicine, pers. comm., August 2, 2010). He observed that the .577 had a clearly demonstrated ability to humanely dispatch a gray whale, but also identified a range of possible calibers from .458 to .700.[63] Dr. Ingling also expressed reservations about a .50 caliber that was heavy (some models weigh 30 lbs (14 kg) or more), had a single-shot capacity, and a muzzle break[64] creating dangerous blast and noise issues in the restricted space of a boat. In his 1999 report, Ingling noted that "the weight of the [tested] .50 BMG, 20 lbs. (9 kg) versus the weight of the .577, 14 lbs. (6.4 kg), and more importantly, the 3-shot magazine of the .577 clearly makes the .577 the more suitable weapon for humanely dispatching gray whales." Gun manufacturers continue to modify the .50 caliber and there are currently models available that are as light or lighter than the .50 caliber rifle tested by Ingling (1999), have multi-round magazines, and modern muzzle break or silencer systems that may reduce blast and noise concerns (e.g., Anzio Ironworks 2013; MICOR 2013). Therefore, we consider the Tribe's proposed .50 caliber rifle, with its readily available supply of ammunition, the weapon that Makah hunters would most likely use.

This EIS does not examine the use of a different, smaller caliber rifle as the killing weapon (Subsection 2.4.6.2, Kill Whales with Smaller Caliber Rifles, explains why this alternative was considered but eliminated from detailed study). In the Russian Federation, the Chukotka Natives hunt gray whales using smaller caliber rifles as well as hand-thrown darting guns. The Russian Federation reported that during the 2002 harvest, approximately 28 percent of whales struck were

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[63] "The only other record of a .577 being used to kill a whale was in April 2010, when a team of biologists and veterinarians (including Dr. Ingling) used three shots from a .577 in combination with drug injections to euthanize a 30-foot (9.1 m) long humpback whale that had stranded in heavy surf in East Hampton, New York" (NMFS 2010).

[64] A device fitted to the end of the barrel that reduces gun recoil by re-directing gases that propel the bullet.

killed with various rifles ranging in size from .22 to .32 caliber. Hunters used from 3 to 100 bullets per whale in 2002 and an average of 54 bullets per gray whale killed (down from 64 bullets per whale in 2000; IWC 2004c). Mean time to death for both the rifle and darting gun was 32 minutes for gray whales, with a maximum time to death of 56 minutes (IWC 2004c). For the 2008 hunt, the Russian Federation reported that the maximum number of shots per gray whale killed was 140 and the mean and maximum time to death was 31 minutes and 95 minutes, respectively (IWC 2009b). During the 2011 hunt, Chukotkan hunters again used darting guns and rifles, averaging 92 bullets per gray whale killed (with a reported maximum of 250 bullets) and a mean time to death of 37 minutes and a maximum time to death of 125 minutes (IWC 2012j).

Minke whales are also hunted with rifles; however, these whales are substantially smaller than adult gray whales. In the Greenland collective minke whale hunt, the animals are usually first wounded with shots from a rifle (typically .30 caliber), then secured with hand-thrown harpoons before finally being killed with rifles (Greenland Home Rule Government and Greenland Hunter's Organization 2006).[65] The rifle used in 2005 was identified as a .30 caliber but the number of bullets used was not reported. The average time to death reported for 44 whales killed in the 2005 hunt was 21 minutes, with a maximum time to death of 90 minutes. This report noted that time to death might be shortened if a larger caliber rifle were used, but this could also increase the number of struck and lost animals that die and sink before they can be secured with harpoon lines and floats. In the 2010 and 2011 collective hunts, a rifle of unknown caliber (but larger than .30) was used as the primary weapon in east Greenland minke hunts. Nine whales were killed in 2010 and six of these were assessed for time to death (IWC 2011e). The average time to death was the same as in 2005 (21 minutes) while the maximum time was shorter at 30 minutes. In 2011, 9 out of 10 whales were assessed, with an average time to death of 29 minutes and a maximum time of 90 minutes (IWC 2012m).

In the Norwegian commercial hunt for minke whales, Knudsen and Øen (2003) concluded that the .357 and .458 caliber rifles and ammunition used "are highly capable of causing permanent brain damage of sufficient severity to account for an instantaneous or rapid loss of consciousness." According to Knudsen (2005), "[a] whale that is shot in or near the brain with the rifle will also normally turn over immediately and the flippers and jaw will relax." In the Norwegian hunt, almost all whales (95.5 percent) are killed with the first strike by a penthrite

[65] When possible, the harpoon is used to secure the whale before wounding it.

grenade (Øen 2006), and the time to death is not separately reported for whales killed with bullets. For whales killed with a rifle after the grenade failed to kill the whale, the mean number of bullets used was 2.6 (in the 1998/1999 season), 2.2 (in the 2000/2001 season), and 2.2 (in the 2001/2002 season) (Knudsen 2005).

Explosive Grenade as the Killing Weapon

In addition to the Makah Tribe's proposal to kill whales using a .50 caliber rifle, this EIS examines use of an explosive projectile to kill the whale, delivered by either a hand-thrown darting gun or a shoulder gun (Subsection 2.3.2.2, Gray Whale Hunt Details). The cervical and cranial thoracic regions of a whale are the critical target areas for explosive projectiles. Penetration into these regions results in detonation next to the skull and vertebrae, or within the thoracic cavity (O'Hara et al. 1999). How effective the grenade is in killing the whale quickly will depend on where the whale is hit and whether the projectile penetrates to a suitable depth (O'Hara et al. 1999).

Two types of grenades are currently available and in use (e.g., by Alaska Eskimo hunters)—slow-burning black powder grenades and fast-burning penthrite grenades. Both types have a time-delay fuse designed to detonate the grenade after penetrating the whale. Detonation releases fragments, or shrapnel, causing hemorrhaging and damage to internal organs (O'Hara et al. 1999). The blast from a black powder grenade also emits shock waves that can cause concussion-related injuries to the brain or internal organs (O'Hara et al. 1999). The blast from a penthrite grenade emits a much higher energy shock wave, which is more likely to cause concussion-related injuries further from the blast site, including injuries to the whale's brain or internal organs. These injuries may cause insensibility or immediate death (Øen 1995; O'Hara et al. 1999). If the grenade does not hit a target area, it has a higher probability of killing the whale than a black powder grenade because it can cause damage farther from the point of detonation (O'Hara et al. 1999; Smith 2007).

In 1988 through 1992, Øen (1995) conducted field trials using penthrite projectiles in the Alaska Eskimo bowhead hunts and comparing them to black powder projectiles used from 1984 to 1986. Data for black powder grenades were the most reliable for 1988 because the information was systematically collected. Results showed reduced time to death for penthrite as compared to black powder (Øen 1995). In 1988, five of the eight bowhead whales (63 percent) died in less than 5 minutes (Øen 1995). The grenades were modified subsequent to the initial penthrite field trials, and data in 1997 and 1998 indicated that time to death was 50 percent of the time to death for black powder grenades (O'Hara et al. 1999). At the 2006 Whale Killing Method Workshop, the AEWC reported that, when placed near the blow hole or within the thorax, the penthrite projectiles appear to give a more rapid time to death than traditional black powder (Alaska Eskimo Whaling Commission 2006; IWC 2007a). The chairperson of the AEWC weapons improvement program has also reported a general preference among Alaska Natives for penthrite, rather than black powder grenades, because “with black powder, the meat has a gas taste” (Associated Press 2005). In 2011, the chairperson of the AEWC reported that penthrite grenades had been distributed to over half of the villages and that the use of these weapons “can reduce the time to death for a bowhead whale to 4 seconds, this being the length of time on the grenade’s fuse” (IWC 2011d). The following year the chairperson reported that the use and success of the new penthrite grenade was increasing (IWC 2012h).

The Chukotka Natives use both rifles and darting guns to kill whales. They have used penthrite grenades, but they primarily use black powder grenades. At the IWC Annual Meeting in 2003, the Russian Federation reported that approximately 72 percent of whales killed were killed using the darting gun. Mean time to death for gray whales using both methods was 43 minutes, with a maximum of 220 minutes. In the 2002 season, hunters used an average of 2.7 darting gun projectiles per whale killed (IWC 2004c) and this ratio has remained relatively stable during the past decade (Borodin et al. 2012). The mean and maximum time to death for gray whales killed with darting guns in the 2002 hunts was 32 minutes and 56 minutes, respectively. In 2006, for whales killed using a darting gun with a black powder explosive projectile, Chukotka Native hunters reported an average time to death of 32 minutes for 88 whales (minimum 3 minutes, maximum 3 hours) (IWC 2007c). In 2011, the government of Chukotka purchased 45 darting guns to improve the humaneness of the gray whale hunt (IWC 2012g).

3.4.3.5.5 Proportion of Whales Struck and Lost

During the Makah Tribe’s 1999 and 2000 hunts, there were no whales struck and lost; the only whale struck was landed (Gosho 1999; Gearin and Gosho 2000). In the 2007 unauthorized hunt involving several Makah Tribal members, the whale was struck and then allowed to die and sink several hours after enforcement agents stopped the hunt (Scordino 2007a, 2007b).

As noted previously, the Chukotkan hunt for gray whales is not directly comparable to the Makah Tribe’s proposed hunt because the Chukotkans use harpoons and either smaller caliber rifles, darting guns, or both (IWC 2007a). Of the more than 1,400 whales struck by Chukotkan hunters during the period 2003 to 2013, only 2.3 percent have been struck and lost (IWC Annual Reports 2004-2014; Ilyashenko 2013; Ilyashenko and Zharikov 2013). The ratio of struck-and-lost whales to total whales struck is shown in Table 3-12.

Table 3-12. Ratio of struck-and-lost whales to total whales struck in Chukotkan gray whale hunts.

Year	Struck and Lost	Total Struck
2003	2	128
2004	1	111
2005	9	124
2006	5	134
2007	3	131
2008	3	130
2009	0	115
2010	0	118
2011	4	132
2012	4	143
2013	2	127

Source: IWC Annual Reports 2004-2012, Ilyashenko 2013, and Ilyashenko and Zharikov 2013

Most of the bowhead whales in the Alaska Eskimo hunt are hunted using hand-thrown darting guns and shoulder guns with black powder grenades. During a field trial of penthrite grenades in 1988, Øen (1995) reported that seven of the eight bowhead whales (88 percent) struck with the penthrite projectile were landed. In 1978, the AEWC committed to the IWC to increase the efficiency (i.e., proportion of whales struck vs. landed) of their bowhead hunt from an average of 50 percent to an average of 75 percent. In 2011, the AEWC reported that while there can be significant year-to-year variability, the 13-year average efficiency was 77.3 percent from 1996 to 2010. In the 2010 hunt, eight whales were struck with the penthrite projectile and five were landed after instant or near-instant kills (IWC 2011d). The most recent report available from the AEWC (IWC 2012) states that during the 2011 bowhead hunt 51 whales were struck and 38 whales were landed (a 74.5 percent efficiency). It also notes that a total of 26 whales were reported as instant or near-instant kills, including all but three of those taken using penthrite grenades. Also, results from the 2012 spring hunt indicate that hunters from one village took six whales using penthrite grenades; all were reported as very quick kills and no whales were lost (IWC 2012h).

3.4.3.5.6 Training and Weapons Improvement

The Makah's proposed action includes a training and certification program. The Tribe also proposes to conduct research and development to refine hunting methods further and revise tribal regulations periodically to improve the safety, effectiveness, and humaneness of the gray whale hunt. This provision is similar to the Alaska Eskimo Whaling Commission's Weapons Improvement Program, which has worked since the late 1980s to develop newer technologies (including use of the penthrite grenade) to increase hunting safety and efficiency (IWC 2011d). Hunter training would likely reduce time to death and decrease the proportion of struck and lost whales (Alaska Eskimo Whaling Commission 2006; Greenland Home Rule Government and Greenland Hunter's Organization 2006). Dr. Ingling emphasized the need for a codified training and qualification program, including regular re-certification for the various whaling crew duties and training in gray whale anatomy (A. Ingling, Doctor of Veterinary Medicine, pers. comm., August 2, 2010).

3.4.3.5.7 Weather and Sea Conditions

Weather and sea conditions in the project area as they relate to safety are discussed in detail in Public Safety, Subsection 3.15.3.2, Weather and Sea Conditions. Weather and sea conditions, including motion of the vessel, also may have implications for harpooner or rifleman accuracy, which could affect a whale's time to death and the proportion of whales struck and lost. The efficiency of the hunt could also be affected by these conditions if they improve the ability of the Tribe to successfully tow and land a killed whale. The Makah proposal includes the use of a motor-powered vessel to position the rifleman and to tow a killed whale to shore, and it includes maintaining a 30-foot (9.1-m) maximum distance from the rifleman to the whale with minimum visibility of 500 yards (457.2 m).

3.4.3.5.8 Behavior of People Associated with the Hunt

The behavior of people associated with the Makah hunt, including protesters, is also discussed in detail in Public Safety, Subsection 3.15.3.4, Behavior of People Associated with the Hunt. Based on the 1999 and 2000 protester interventions on the water, and the continuing degree of public and media interest in this issue, vessels and people may interfere with whaling activities, increase the time to death, and increase the potential for not successfully landing a whale struck by Makah hunters.

3.4.3.6 Known and Potential Anthropogenic Impacts

Particularly along the coast of North America, gray whales are exposed to intense human activity. Moore and Clarke (2002) concluded that "[t]he recovery of the gray whale population in the face of long-term exposure to human activities along the North American coast suggests a strong degree of tolerance to such activities." The recovery of the ENP gray whale stock in the face of aboriginal subsistence hunting by Chukotka Natives similarly suggests a tolerance to such activity. The following discussion examines some of the more prominent activities affecting gray whales.

3.4.3.6.1 Aboriginal Subsistence Whaling

ENP gray whales have been hunted by various aboriginal groups for hundreds to thousands of years. In the whales' northern feeding areas, five groups of aborigines hunted along the Chukotkan Peninsula of northeastern Asia in the western Bering, northeastern Okhotsk, and western Chukchi Seas, including the Asiatic (Siberian) Eskimos, Chukchi, Koryaks, Kereks, and Itle'mens (Kamchadals) (Krupnik 1984). The (Alaska) Eskimos also hunted gray whales along the northwestern shores of North America in the eastern Bering and Chukchi Seas for thousands of years (O'Leary 1984). Along the whales' migratory corridors and in the more southern feeding areas south of the Alaskan Peninsula, several Indian tribes between the Aleutian Islands and California hunted gray whales and/or used drift whales for subsistence as a part of their cultural and religious traditions, including the Aleuts, Koniag, Chugash, Tlingit, Haida, Tsimshian, Nootka, Makah (including Ozette), Quileute, Klallam, and Chumash (O'Leary 1984). Some of these tribes hunted during the American and industrial commercial whaling eras. The last Makah hunts in this timeframe were recorded in the 1920s. Table 3-13 identifies the historical (1600 to 1943) aboriginal catches of ENP gray whales reported by Punt and Wade (2012), amounting to nearly than 55,000 whales (approximately 160 whales per year) during that 343-year period.

Table 3-13. Estimated historical (pre-1944) aboriginal catches of ENP gray whales.

Years	Annual # Killed	Years	Annual # Killed
1600-1675	182	1881-1890	108
1676-1750	183	1891-1900	62
1751-1840	197.5	1901-1904	61
1841-1846	193.5	1905-1915	57
1847-1850	192.5	1916-1928	52
1851-1860	187	1929-1930	47
1861-1875	111	1931-1939	10
1876-1880	110	1940-1943	20

Source: Punt and Wade 2012.

Between 1948 and 1955, subsistence hunters in the Chukotkan Region took 241 total gray whales, averaging 30 whales annually (Zimushko and Ivanshin 1980). From 1956 to 1968, the catches in that region increased to an average 158 animals annually (Zimushko and Ivanshin 1980). From 1968 to 1977, the Soviet Ministry of Fisheries imposed catch limits of 140 to 150 whales from 1968 to 1972 and 200 whales annually from 1972 to 1977 (Zimushko and Ivanshin 1980). The IWC established aboriginal subsistence whaling catch limits for the ENP gray whale stock starting in 1978 (Table 3-14). Since then, a total of 4,460 harvested gray whales have been reported to the IWC (averaging over 127 whales per year), with all but 24 of these whales being taken by Russian/Chukotkan hunters. These hunters typically hunt gray whales beginning in June or July when the waters become ice free (Krupnik 1987) and continue through the summer and fall. For example, all of the gray whales harvested by Chukotkans in 2009 were taken between June and November, while in 2011 the first and last whales were harvested on May 15 and November 8, respectively (IWC 2012k). Gray whale catches that the United States reported to the IWC include the one whale harvested by the Makah Tribe in 1999 and the one whale killed in 2007 in the unauthorized hunt by members of the Makah Tribe (IWC 2008). Although Alaska natives hunted whales prior to 1989, the United States has not presented a proposal to the IWC for this hunt, nor has NMFS published a quota under the WCA.

3.4.3.6.2 Environmental Contaminants

Environmental contaminants that enter the marine environment through atmospheric, ocean current, and terrestrial transport originate from a variety of urban and rural anthropogenic sources, including agricultural use of pesticides, industrial disposal of manufacturing or pharmaceutical by-products, industrial processing or burning of fossil fuels, and municipal discharge or runoff associated with landfills, wastewater treatment plants, and miles of streets and roads. Marine ecosystems in the northeastern Pacific receive pollutants from a variety of local, regional, and international sources (Grant and Ross 2002; EVS Environmental Consultants 2003; Garrett 2004; Krepakevich and Pospelova 2010).

Table 3-14. Aboriginal subsistence whaling catch data for ENP gray whales reported to the IWC.

Year	Total Multi-year Allocation by IWC	Total Annual Allocation by IWC	Total Takes	Russian Federation (Chukotkans)	United States (Alaska Eskimos)	United States (Makah)
1978	na	179	184	182	2	0
1979	na	179	182	178	4	0
1980	na	179	181	178	2	0
1981	na	179	135	135	0	0
1982	na	179	169	165	4	0
1983	na	179	171	169	2	0
1984	na	179	168	168	0	0
1985	na	179	170	169	1	0
1986	na	179	171	169	2	0
1987	na	179	159	158	1	0
1988	na	179	151	150	1	0
1989	na	179	180	179	1	0
1990		179	162	162	0	0
1991		179	169	169	0	0
1992	na	169	0	0	0	0
1993		169	0	0	0	0
1994		169	44	44	0	0
1995	na	140	92	90	2	0
1996		140	43	43	0	0
1997		140	79	79	0	0
1998	620 (to Russian Federation and United States)	140	125	125	0	0
1999		140	124	123	0	1
2000		140	115	115	0	0
2001		140	112	112	0	0
2002		140	131	131	0	0
1998-2002 Total			*607*	*606*	*0*	*1*
2003	620 (to Russian Federation and United States)	140	128	128	0	0
2004		140	111	111	0	0
2005		140	124	124	0	0
2006		140	134	134	0	0
2007		140	132	131	0	1
2003-2007 Total			*629*	*628*	*0*	*1*
2008	620 (to Russian Federation and United States)	140	130	130	0	0
2009		140	116	116	0	0
2010		140	118	118	0	0
2011		140	128	128	0	0
2012		140	122	122	0	0
2008-2012 Total			*614*	*614*	*0*	*0*

Sources: IWC Annual Reports and the IWC website at http://iwc.int/table_aboriginal.

These chemicals and compounds include organochlorines (e.g., DDT, PCB, dioxins, and furans), heavy metals (e.g., copper, mercury, and lead), and newly emerging chemicals (i.e., those recently discovered, such as flame retardants), that may have direct lethal effects on individual animals or insidious effects on animal populations through impaired reproductive, metabolic, and immune functions (O’Hara and O’Shea 2005). Bioaccumulation through trophic transfer in the marine food chain allows relatively high concentrations of these compounds to build up in top-level marine predators, such as marine mammals (O’Shea 1999). Gray whales may ingest these environmental contaminants when they bottom feed in areas where the sediment and benthic prey are contaminated.

Subsection 3.16.3.2, Environmental Contaminants in Gray Whales, discusses the ‘stinky whale’ phenomenon and describes concentrations of organochlorines in gray whale tissues with information synthesized from various studies. Many organochlorines are highly fat soluble and have poor water solubility, which allows them to accumulate in the fatty tissues of animals where most storage occurs (O’Shea 1999; Reijnders and Aguilar 2002). Some are highly persistent in the environment and resistant to metabolic degradation. Pinnipeds and porpoises carry far greater amounts of PCBs and DDTs than baleen whales and fish, however, because of their higher positions in food chains (O’Shea and Aguilar 2001; Reijnders and Aguilar 2002).

Subsection 3.16.3.2, Environmental Contaminants in Gray Whales, also addresses concentrations of heavy metals (including mercury, lead, and copper, among others) in gray whale tissues with information synthesized from various studies. The three elements usually considered of greatest concern to cetaceans are mercury, cadmium, and lead (O’Shea 1999). Mercury, cadmium, and other metals accumulate primarily in the liver and kidneys, whereas lead concentrates mostly in bones (Reijnders and Aguilar 2002). Concentrations of most metals tend to increase throughout an animal’s lifeand are stored in fatty tissues. There are, however, organic forms of metals, such as methylmercury, that accumulate in the lipids of prey species. Many marine mammal species can tolerate high amounts of metals or detoxify them (Reijnders and Aguilar 2002; Wise et al. 2009). Published accounts of metal-caused pathology are scarce (O’Shea 1999).

In the 1999 and 2000 mass stranding events, chemical contaminants were a possible factor contributing to the increased mortality (Gulland et al. 2005). Overall, however, no contaminant found would be the proximate cause for acute mortality of the observed magnitude (Gulland et al. 2005). The mean concentrations of organochlorines in the blubber of gray whales stranded in 1999 were well below levels observed in apparently healthy gray whales harvested in Russia (Tilbury et al. 2002). Also, lower levels of total mercury and methylmercury were reported in the muscle, kidney, and liver tissues of four gray whales that stranded in the Gulf of California in 1999 than were reported for other marine mammals, though sampling differences and the effect of decomposition on blubber lipids may alter the results of chemical analysis (Gulland et al. 2005).

As described below in Subsection 3.4.3.6.12, Marine Debris, a devastating earthquake and tsunami struck Japan in 2011 and washed an estimated 5 million tons of debris into the North Pacific Ocean. In addition, the tsunami damaged several nuclear reactors in the Fukushima Daiichi Nuclear Power Plant complex causing them to release radiation into the atmosphere and North Pacific Ocean. In response a number of agencies have been actively monitoring water, debris, biota and sediment, with the U.S the Environmental Protection Agency playing a lead role in such U.S. monitoring (EPA 2011a). Radiation experts have determined that it is highly unlikely that any tsunami-generated marine debris holds harmful levels of radiation. Some marine debris collected along shorelines in Hawaii and on the West Coast, including debris known to be from the tsunami, has been tested, and all readings were normal (Ecology 2013b; EPA 2011a; NOAA 2013a).

In response to the Japanese nuclear incident, the EPA accelerated and increased sampling frequency and analysis to confirm that there were no harmful levels of radiation reaching the U.S. from Japan and to inform the public about any level of radiation detected. After a thorough data review showing declining radiation levels, on May 3, 2011, EPA returned to the agency's routine sampling and analysis process for precipitation, drinking water and milk (EPA 2011a). According to researchers at the Woods Hole Oceanographic Institute, "[l]evels of any Fukushima contaminants in the ocean will be many thousands of times lower after they mix across the Pacific and arrive on the West Coast of North America in 2014. This is not to say that we should not be concerned about additional sources of radioactivity in the ocean above the natural sources, but at the levels expected even short distances from Japan, the Pacific will be safe for boating, swimming, etc." (Woods Hole Oceanographic Institution 2014).

3.4.3.6.3 Harmful Algal Blooms

Single-celled algae are the base of the food chain in the marine environment, and they proliferate or aggregate to form dense concentrations of cells called blooms when certain environmental conditions prevail. Algal blooms can produce marine biotoxins, which can accumulate in fish, seabirds, and other marine biota. Harmful algal blooms occur in coastal marine environments throughout the United States, including waters of Puget Sound and off the coasts of Washington, Oregon, and California. There is evidence that harmful algal blooms have increased in frequency, magnitude, and seasonal duration, possibly as a result of global climate change, toxic algal species extending to new areas, and human-related eutrophication of the coastal environment (Trainer 2002). Though less than 5 percent of the known dinoflagellate species and fewer than 25 species in one genus of diatoms produce compounds that are known to be toxic to marine mammals (Van Dolah 2005), some marine mammal morbidity and mortality, including mass strandings, have been associated with marine biotoxin exposure and harmful algal blooms. Along the west coast of the United States, some of the most deleterious biotoxins produced by harmful algal blooms include saxitoxin (the toxin that causes paralytic shellfish poisoning in humans), domoic acid, and the marine alga *Heterosigma akashiwo* (Horner et al. 1997). Gray whales have thus far been shown to be affected by saxitoxin or domoic acid, as explained below.

Saxitoxin

In 1987, acute levels of saxitoxin, produced by a dinoflagellate bloom, were associated with the death of 14 humpback whales off the coast of Cape Cod, Massachusetts (Geraci 1989; Van Dolah 2005). Saxitoxin was also a contributing factor in the mortality of bottlenose dolphins in a Florida lagoon in 2001 and 2002 (Van Dolah 2005). Scientists have also postulated that chronic, sublethal exposure to saxitoxin through ingestion of copepods may affect right whale reproductive rates by lowering diving rates and feeding time, and decreasing overall fitness (Van Dolah 2005). Researchers have demonstrated that saxitoxin has a high affinity and specific binding to the nerve preparations of the brains of gray whales, humpback whales, California sea lions, and manatees (Trainer and Baden 1999).

Domoic Acid

In 1991, the first evidence of domoic acid on the west coast of North America was a mass mortality of pelicans and cormorants in Monterey Bay, California (Van Dolah 2005). The first confirmed domoic acid poisoning of marine mammals occurred in 1998 in the same area, when more than 70 California sea lions stranded from San Luis Obispo to Santa Cruz (Scholin et al. 2000). Of the 70 sea lions that stranded, 57 sea lions died because of acute toxicity from eating anchovies (Van Dolah 2005). A similar event occurred in 2000 in the same region, when the stranding of 187 sea lions was associated with domoic acid (Gulland et al. 2002; Van Dolah 2005). Concurrent with the 2000 sea lion mortality event, abnormally high numbers of gray whale strandings occurred (Van Dolah 2005). One of the three gray whales whose cause of death was determined in the 1999 and 2000 unusual mortality event was likely intoxicated with domoic acid (Gulland et al. 2005). The levels of domoic acid in the necropsied whale would indicate acute toxicosis in a laboratory primate, but toxic doses for cetacea are undetermined (Truelove and Iverson 1994). Biotoxins were thus one of the factors listed as potentially contributing to the increased number of gray whale mortalities observed in 1999 and 2000, though too few carcasses were adequately sampled to assess their importance in the mortality event (Gulland et al. 2005). In February 2002, researchers documented a domoic acid event on the California coast. This event involved nine marine mammal species and the deaths of thousands of sea lions; none of the reported strandings or deaths was a gray whale (Van Dolah 2005). In a review of the effects of domoic acid on wildlife, Bejarano et al. (2008) did not report any evidence of toxicity in gray whales. In marine mammals other than California sea lions, the association between exposure to domoic acid and abnormal clinical signs has been limited to epidemiological associations rather than direct measurement of domoic acid in body fluids of affected animals (Lefebvre et al. 2010).

3.4.3.6.4 Oil Spills and Discharges

Exposure to petroleum hydrocarbons released into the marine environment through oil spills and other discharge sources represents another potential anthropogenic impact on gray whales in the project area. Inhalation of vapors at the water's surface and ingestion of hydrocarbons during feeding are the most likely pathways of exposure. Acute exposure to petroleum products can cause changes in behavior and reduced activity, inflammation of the mucous membranes, lung congestion, pneumonia, liver disorders, and neurological damage (Geraci and St. Aubin 1990). Marine mammals can generally metabolize and excrete limited amounts of hydrocarbons, but acute or chronic exposure poses greater toxicological risks (Grant and Ross 2002).

At the water's surface, gray whales have been observed lying in or swimming through oil from the *Exxon Valdez* oil spill along the Alaska coast (Moore and Clarke 2002), and they have been observed migrating through natural seeps near Santa Barbara, California (Kent et al. 1983). Kent et al. (1983) observed that gray whales generally swam faster, stayed submerged longer, and took fewer breaths than whales that did not pass through oil; whales also sometimes changed direction to swim around the surface oil, though it was not clear that the change in direction was in response to the oil. Some scientists have concluded that cetaceans have a thickened epidermis that greatly reduces the likelihood of petroleum toxicity from skin contact with oiled waters (Geraci 1990; O'Shea and Aguilar 2001). Geraci (1990) proposed that gray whales probably experience eye and tactile hair follicle irritation upon contact with oil, but that long-lasting effects to skin tissue were less likely. This observation was based on laboratory tests on bottlenose dolphins, because the dolphins did not exhibit a vascular reaction to contact with petroleum products (Geraci 1990). Other scientists have proposed that cetaceans with rough or damaged skin, such as the barnacle-covered skin of a gray whale, may be more susceptible to oil contamination and subsequent bacterial infection than smoother-skinned cetaceans (Albert 1981). Moore and Clarke (2002) reported that it is unclear whether gray whales can detect surface oil.

Gray whales could consume oil from fouled baleen, by engulfing tar balls, or by bottom feeding on contaminated sediments (Geraci 1990; Moore and Clarke 2002), though there are no reported cases of ingestion. Twenty-five whales that stranded after the *Exxon Valdez* spill had oil on their baleen but not in their digestive tracts, suggesting that the baleen was fouled after death (Moore and Clarke 2002). Geraci and St. Aubin (1985) concluded that oil impact on baleen was slight and short term, based on laboratory tests where 70 percent of oil was flushed from baleen in 30 minutes, but Geraci (1990) proposed that baleen fibers could remain oiled if a whale was feeding in a highly oiled area where fouling outpaced the flushing rate. Moore and Clarke (2002) noted that oil and chemical dispersants, used to break up surface oil and cause it to sink, could contaminate benthic sediments. They proposed that any large-scale contamination of a primary feeding area could negatively affect the population.

Exploration and development of offshore oilfields have the potential to release petroleum products and other contaminants into waters used by gray whales. In 1969, a federal platform offshore of Santa Barbara, California, experienced a blowout in one of its wells, releasing an estimated 3.4 million gallons of oil into the ocean. Since then, a total of approximately 37,000 gallons of oil have been spilled as a result of natural gas and oil operations offshore of California (Bureau of Ocean Energy Management 2015).

Areas of active oil and gas development within the migratory range of ENP gray whales include Southern California and the Chukchi and Beaufort Seas north of Alaska. Onshore refineries and shipping facilities associated with these areas also present a risk of spills, as does shipping traffic. No oil and gas development occurs in the Pacific coastal waters of Mexico, but a refinery at the coastal city of Salina Cruz processes and ships petroleum products from the Gulf of Mexico. There are no active oil or gas leases off the coasts of Oregon or Washington. A moratorium on leasing for offshore oil and gas exploration and development is currently in place in these areas. An informal moratorium on oil and gas drilling off the coast of British Columbia has been in place since the early 1970s. The federal and provincial governments have both said they have no plans for offshore oil and gas exploration in that area anytime soon (CBC News 2011).

During the period from 2000 to 2008, a total of 500,600 gallons of oil was spilled in the Pacific Ocean (U.S. Coast Guard 2010). During the same period, the U.S. Coast Guard (2010) reported approximately 468,000 gallons of oil spilled in the waters of Alaska. The data for Alaskan waters includes spills in the Pacific Ocean as well as the Arctic Ocean; therefore, the total amount of oil spilled in United States coastal waters in the range of the ENP gray whale is less than the total of those two amounts. In most years, tank ships, barges, and other vessels accounted for more than half of the total amount of oil spilled nationwide. Processing facilities and pipelines were other major sources of spills (U.S. Coast Guard 2010).

Because of its proximity to Alaska's crude oil supply, Puget Sound is one of the leading petroleum refining centers in the United States, with about 15 billion gallons of crude oil and refined petroleum products transported through it annually (Puget Sound Action Team 2005). Inbound oil tankers carry crude oil to four major refineries in Puget Sound, while outbound tankers move refined oil products to destinations along the United States' west coast (Neel et al. 1997). In 2011, 1,106 oil tankers passed through Washington's waters bound for ports in Puget Sound, Canada, and along the Columbia River (Ecology 2012b). This volume of shipping traffic puts the region at risk of having a catastrophic oil spill. The possibility of a large spill is one of the most important short-term threats to coastal organisms in the northeastern Pacific (Krahn et al. 2002).

Neel et al. (1997) reported that shipping accidents were responsible for the largest volume (59 percent; 3.4 million gallons [12.9 million L]) of oil discharged during major spills in Washington from 1970 to 1996. Other sources were refineries and associated production facilities (27 percent; 1.5 million gallons [5.7 million L]) and pipelines (14 percent; 800,000 gallons [3.0 million L]). Eight major oil tanker spills exceeding 100,000 gallons (378,500 L) have occurred in the state's coastal waters and on the Columbia River since the 1960s, with the largest estimated at 2.3 million gallons (8.7 million L). Grant and Ross (2002) did not report any major vessel spills from British Columbia during this same period, but at least one spill of 100,000 gallons (378,500 L) is known to have occurred in Canadian waters at the mouth of the Strait of Juan de Fuca in 1991 (Neel et al. 1997). In addition to these incidents, numerous near accidents have resulted from vessel groundings, collisions, power loss, or poor vessel condition (Neel et al. 1997).

Between 1995 and 2008, a total of 340,000 gallons (1.29 million L) of petroleum products were spilled in the waters of Washington State (Environmental Research Consulting 2009). More than 80 percent of this resulted from a single event, when 277,000 gallons (1.05 million L) of gasoline spilled from a pipeline in Bellingham in 1999. Most of the remaining total spilled volume came from oil tankers, tank barges, and cargo vessels. Environmental Research Consulting (2009) concluded that, from the perspective of prevention and preparedness, oil tankers represent over 75 percent of the potential risk for worst-case oil discharge, followed by cargo vessels (15 percent of the potential risk), and oil tank barges (6 percent).

Puget Sound's four oil refineries are located on the coast at Anacortes (Shell Oil and Texaco), Ferndale (Mobil Oil), and Tacoma (United States Oil). Four major spills have occurred at two of these facilities, with each causing some discharge of petroleum into marine waters (NMFS 2005d). Pipelines connecting to refineries and oil terminals at ports represent another potential source of coastal spills. Pipeline leaks have caused several major spills in Western Washington, but only the 1999 Olympic spill resulted in any discharge to marine waters (Neel et al. 1997).

During the late 1980s and early 1990s, Washington significantly upgraded its efforts to prevent oil spills in response to increased spills in the state and the *Exxon Valdez* accident in Alaska. A number of state, provincial, and federal agencies now work to reduce the likelihood of spills, as does the Makah Tribe and the regional Oil Spill Task Force, which formed in 1989. National statutes enacted in the early 1990s, including the United States Oil Pollution Act in 1990 and the Canada Shipping Act in 1993, have also been beneficial in creating spill prevention and response standards. Since 2008, Washington State has maintained a rescue tugboat at Neah Bay year-round to aid disabled vessels and thereby prevent oil spills. These measures appear to have helped reduce the number and size of spills since 1991 (Neel et al. 1997). For example, in 2010 the Neah Bay emergency tugboat *Hunter* towed the disabled 712-foot container ship *Horizon Tacoma* to the Port of Tacoma after an engine malfunction in the Strait of Juan de Fuca (Gottlieb 2010). This same container ship also lost propulsion in the Strait of Juan de Fuca in October 2011 and was escorted to Port Angeles by the emergency tugboats *Jeffrey Foss* from Neah Bay and *Garth Foss* from Port Angeles (U.S. Coast Guard News 2011). In general, Washington's outer coast, the Strait of Juan de Fuca, and areas near the State's major refineries are the locations most at risk of major spills (Neel et al. 1997). An "area to be avoided" was designated in the OCNMS (Subsection 3.1.1.1.3, Current Issues) to minimize the risk of spills by routing large vessels away from dangerous and sensitive areas. An analysis by NOAA of the effectiveness of the voluntary area to be avoided shows a decrease in the number of commercial vessels transiting the area following the designation. From July through September 1995 (the year in which the area to be avoided was established), 643 vessels transited the area. By 2010, that number had diminished to 61 for the entire calendar year (Ecology 2011).

Chronic small-scale discharges of oil into marine waters from a variety of sources, including tanker ballast waters, ship bilge and fuel oil, and municipal and industrial waste, greatly exceed the volume released by major spills (Clark 1997) and are another potential impact to gray whales. Though chronic oil pollution has been documented in large numbers of seabird deaths (e.g., Wiese and Robertson 2004), less is known about its impact on gray whales and other marine mammals. The long-term effects of repeated ingestion of sub-lethal quantities of petroleum hydrocarbons on marine mammals are also unknown.

3.4.3.6.5 Offshore Activities and Underwater Noise

Anthropogenic activities in the ocean have increased over the past 50 years, resulting in more underwater noise (Hildebrand 2005; Nowacek et al. 2007). Underwater noise is often regarded as the primary source of disturbance to gray whales (Malme et al. 1988; Moore and Clarke 2002; Richardson et al. 1995; Weller et al. 2006a; Weller et al. 2006b). The types of anthropogenic activities that cause underwater noise within the migratory range of the ENP gray whales include offshore oil and gas development; vessels, including commercial fishing, whale-watching, and scientific research vessels; and training exercises conducted in coastal and offshore waters by the United States Navy. Training activities involve the use of aircraft, marine vessels, submarines, sonar, and explosives. Noise specifically related to whale-watching and other vessel disturbance is described below. A broader discussion of noise (including both atmospheric and underwater noise) in the project area is in Subsection 3.11, Noise, and its effects on wildlife other than gray whales is in Subsection 3.5, Other Wildlife Species.

Gray whale reactions to underwater noise have been relatively well studied compared to those of other mysticetes (Moore and Clarke 2002). Overall, their reactions are variable and influenced by characteristics of the noises they are exposed to (e.g., intensity and temporal pattern of sound) and context of the exposures (e.g., their behavior before the exposure occurred). This section summarizes the results of studies that document a variety of gray whale reactions to a broad range of underwater noises.

Researchers have noted short-term behavioral responses of gray whales to different noises associated with seismic exploration. Malme et al. (1983; 1984; 1988) concluded that continuous broadband sound caused a statistically detectable response in about half of the gray whales exposed to sound levels exceeding approximately 120 decibels (dB re 1 μPa- water standard). The whale response was a brief, slight deflection in migratory course around the sound source. Malme et al. (1984) also found that gray whale response to impulsive sound occurred at received levels 30 to 50 dB more intense than their response to continuous sound. Weller et al. (2006a) found that whales swim away from the noise generated by air guns in seismic surveys off Sakhalin Island, Russia, but returned to the areas once the noises ceased.

Changes in distribution and acoustic responses were found during playback experiments in San Ignacio Lagoon in 1985 (Dahlheim 1987, reviewed in Schwarz 2002). Most whales abandoned the breeding lagoon apparently in response to the noise, although the whales returned and regularly inhabited this area in subsequent years (Jones et al. 1994).

In addition to altering swimming course and speed, gray whales exhibited abrupt behavioral changes in response to playback sounds and airgun blasts, including switching from feeding to avoidance, with a resumption of feeding after exposure (Malme et al. 1984), and changing calling rates, call structure, and surface behavior, usually from traveling to milling (Dahlheim 1987). Gray whales altered their vocalizations in response to outboard engine and oil drilling sounds, where four different measures of their calls were significantly higher than those measured in experimental conditions (Dahlheim 1987). Whales adapted their calls in response to the noise, essentially "shouting" and calling more frequently to offset the higher noise levels.

Technical studies conducted to assess the potential impacts of the United States Navy's use of low-frequency active sonar systems investigated the response of baleen whales to low-frequency active sonar signals. The research results confirmed that a portion of the total number of whales exposed to low-frequency active sonar responded behaviorally by changing their vocal activity, moving away from the source vessel, or both, but that the responses were short lived (Department of the Navy 2012). Migrating gray whales avoided exposure to low-frequency active sonar signals when the source was placed in the center of their migration corridor (e.g., Tyack 1999; 2009). In all cases, whales resumed their normal activities within 10s of minutes after the initial exposure to the sonar signal (Department of the Navy 2012).

Malme et al. (1989) prepared a disturbance-ranking scheme for oil and gas noise sources off Alaska. Modeling indicated that gray whales have a high probability of being influenced by noise from oil and gas operations, including large tankers, dredges, and airgun arrays (Malme et al. 1988), but other studies indicated that the noisiest period of offshore oil and gas operations occurs during exploration and site establishment (Richardson et al. 1995). Production activities are generally quieter and require fewer support operations (Moore and Clarke 2002).

Specific gray whale reactions to whale-watching include changing course and altering their swimming speed and respiratory patterns when followed by whale-watching boats (Bursk 1989), but Jones and Swartz (1984) documented that gray whales in the San Ignacio Lagoon of Baja California become less likely to flee as the season progresses. Cow-calf pairs of gray whales are considered more sensitive to disturbance by whale-watching vessels than other age or sex classes (Tilt 1985). Gray whales also preferentially avoid low frequency active transmissions conducted in a landward direction (Tyack and Clark 1998). Reported gray whale reactions to aircraft vary and seem related to ongoing whale behavior and aircraft altitude (Moore and Clarke 2002). Specific gray whale reactions to scientific research (tagging) include fluke-slapping and rapid swimming, but the whales returned to normal behavior shortly after tagging (Harvey and Mate 1984).

3.4.3.6.6 Vessel Interactions

Whale-watching for gray whales is an important educational and recreational industry and activity along the west coast of North America, from the wintering grounds in the lagoons of Baja California to British Columbia, Canada, although most targeted gray whale whale-watching occurs in the winter range, where tourist boats offer trips to see (and sometimes pet) newly born gray whale calves and mothers. While most commercial whale watching off Washington and British Columbia is directed at killer whales (Hoyt 2001), commercial operations off Washington and British Columbia advertise trips for gray whales along the Pacific coast of Washington (out of Westport and La Push), inside Grays Harbor, the Strait of Juan de Fuca, northern Puget Sound, and western Vancouver Island, British Columbia. The activity of commercial whale-watching vessels and private recreational boats has raised concerns about its effect on gray whales. In response to these concerns, regulations are in place to minimize disturbance by vessels in Mexico, the United States, and Canada.

In Mexico, the government has applied whale-watching regulations to commercial operators since 1997 (Carlson 2012). There are currently regulations governing the numbers of boats and methods of approach for four specific whale-watching areas in the lagoons. There are no minimum approach distances, but boats cannot chase whales. The northern two-thirds of San Ignacio lagoon closes to whale watching and fishing activities during the breeding and calving season. In the southern third of San Ignacio lagoon (nearest the ocean), whale-watching tourism is closely regulated to allow access to only limited numbers of people (United Nations 1999). In Washington and British Columbia, NMFS and conservation organizations in the United States have teamed up with the Canadian government and conservation organizations to adopt 'Be Whale Wise' guidelines for vessels, kayaks, and other crafts used for watching whales (www.bewhalewise.org; 76 FR 20870, April 14, 2011; Department of Fisheries and Oceans [DFO] Canada 2012a). The guidelines, among other things, recommend that vessels keep a 100-yard (91.4-m) buffer between the vessel and the whale, and recommend a slow approach speed of 7 knots within 400 yards (365.8 m) of whales. (We recently adopted regulations imposing a 200-yard [183-m] approach limit on killer whales in Puget Sound, but these regulations do not apply to gray whales.)

Whale-watching along the migration route is not heavily regulated and it has been suggested that this activity, in combination with commercial fishing and vessel operations, may cause gray whales to migrate further offshore (Wolfson 1977). Researchers conducted various studies on the reaction of gray whales to whale-watching vessels in winter on their wintering range and, to some extent, during migration (Urbán-Ramírez et al. 2003). Researchers have paid little attention to the northern portion of the summer range in the Bering Sea and adjacent Arctic Ocean because whale watching is largely undeveloped in those areas (Richardson et al. 1995). One study reported on the reaction of gray whales feeding off Vancouver Island during summer to whale watching vessels (Bass 2000). That study found that the number of vessels had a relatively small influence on gray whale feeding behavior and that effects of vessel presence are more pronounced in shallow water sites. In general, scientists remain cautious about drawing conclusions regarding the magnitude of the effects of whale watching on gray whales (e.g., Gard 1974; Rice 1975; Reeves 1977; Jones et al. 1994; Urban-Ramirez and Swartz 2007).

In the winter range, vessels in the lagoons can cause short-term escape reactions in gray whales, especially when boats move erratically or quickly (Ollervides 1997; Reeves 1977; Swartz and Cummings 1978; Swartz and Jones 1978; Swartz and Jones 1981). Bursk (1989) reported that gray whales often changed speed and deviated from their course when near whale-watching vessels. Observers noted that gray whales have also displayed evasive behavior termed snorkeling, where whales came to an almost complete halt to breathe in an inconspicuous manner. Ollervides (1997) found swimming speed decreased and vocalizations changed in response to the presence of boats in Bahia Magdalena. Mosig (1998) reported an inverse relationship between the average number of whale-watching vessels and the average number of gray whales in Laguna San Ignacio in the winter of 1997, but she could not demonstrate any direct effect of vessels on whales. Jones et al. (1994) concluded that whale watching activities were not the cause of the gray whale abandonment of San Ignacio lagoon in the mid-1980s. Observers noted that some gray whales were attracted or showed no response to quiet, idling, slow-moving, or anchored vessels, especially late in winter (Norris et al. 1983; Dahlheim et al. 1984; Jones and Swartz 1984; Jones and Swartz 1986; Richardson et al. 1995). During the course of all of these studies, there has been no evidence of long-term impacts of whale-watching vessels on the behavior of gray whales in the lagoons on the wintering grounds (Gard 1974; Jones et al. 1994).

Along the migration route, including the southern portion of the summer range, whale-watching vessels can also cause short-term behavioral reactions in gray whales. Migrating whales disturbed by vessels tended to exhale underwater and surface only long enough to inhale before re-submerging (Hubbs and Hubbs 1967). Observers noted that migrating gray whales also changed course more often with increasing numbers of whale-watching vessels (Bursk 1983; Bursk, in

Atkins and Swartz 1988). Heckel et al. (2001) found substantial differences in both speed and direction of the transit of migrating gray whales off Baja California with and without the presence of whale-watching vessels. Similarly, Schwartz (2002) found that gray whales off Point Loma, California, maneuvered to avoid whale watching boats; whales sped up when only one vessel actively followed them and slowed down when more than one vessel was in the vicinity. While these studies show migrating gray whales appear to react to whale-watching vessels, there is no other evidence to suggest the whales have altered the location of their migration route.

Whale-watching vessels regularly approach gray whales feeding in Clayoquot Sound, on the west coast of Vancouver Island, British Columbia, during summer. Whales responded to the vessels by changing their dive patterns by surfacing more frequently. While these changes appeared to be temporary when the vessels were present, these findings suggested some loss of foraging time for the whales (Bass and Duffus 1999; Bass 2000).

There have been two cases where it has been speculated that whale watching, in combination with other factors, may have affected long-term gray whale distribution. Between 1975 and 1978, aerial surveys by Dohl and Guess (1979) showed that about 60 percent of gray whales were using migration routes farther offshore than the coast routes they had traveled previously. They concluded that it was the result of an increase in the overall population of gray whales. Between 1964 and 1983, seismic activity in this region was substantial (Malme et al. 1984), but many suggest that increases in noise and vessel traffic in this region were the cause (Rice 1965; Hubbs and Hubbs 1967; Wolfson 1977; Schulberg et al. 1989 and 1991, as cited in Richardson et al. 1995; Mate and Urbán-Ramirez 2003). The second case focused on gray whales feeding in Clayoquot Sound off Vancouver Island; Duffus (1996) demonstrated a sequential increase in gray whale foraging locations away from the major whale-watching port of Tofino over a 3-year period. While it was not possible to determine if the whale watching vessels contributed to or caused this shift in gray whale distribution, Duffus suggests a risk-averse management approach to regulating vessel traffic in gray whale feeding areas.

Harvey and Mate (1984) observed that gray whales sometimes responded to tagging by fluke slapping and rapid swimming, but usually returned to pre-tagging behavior shortly after the event. The response of gray whales to biopsy darts has not been described, but other mysticetes are observed having brief, sometimes dramatic, changes in behavior (Gauthier and Sears 1999). Although the gray whale population is exposed to whale-watching vessels and other disturbances on the wintering grounds and along much of the migration route, it has demonstrated a tolerance and resiliency to whale-watching and other noisy human activities as reflected by the successful recovery of the population from over-exploitation (Cowles et al. 1981; Moore and Clarke 2002).

3.4.3.6.7 Activities Occurring in the Mexican Portion of the Range

Much of the coastal area surrounding the Baja lagoons and the gray whale wintering range is protected by law and limited access. In 1988, the Mexican government established El Vizcaino Biosphere Reserve, an area totaling 2,546,790 acres and encompassing Ojo de Liebre (Scammon's Lagoon), Guerreo Negro, and the San Ignacio Bay gray whale sanctuaries. Portions of the reserve, including San Ignacio and the Ojo de Liebre lagoons, were designated as United Nations Educational, Scientific, and Cultural Organization world heritage sites in 1993 (Urbán-Ramírez et al. 2003). In 2005, the Bay of Loreto National Marine Park, in the northern area of the Sea of Cortez, joined the list. In May 2002, all Mexican territorial seas and the EEZ were declared as a refuge for the protection of large whales. See Urbán-Ramírez et al. (2003) for additional information on formal protection of gray whales in Mexico. Whale watching is discussed above in further detail, but other activities in the winter range that have been identified as future environmental concerns by ParksWatch of Mexico are discussed below.

Mineral and Salt Mining

Mining for minerals (such as copper, manganese, gypsum, cobalt, silica, and phosphorus) peaked in the last century in places like Santa Rosalia, creating soil erosion, contamination, pollution, and litter in the ocean. Large mining companies have since abandoned these sites, and the town is in economic decline (ParksWatch 2004). The largest saltworks in the world is, however, still operating at Guerrero Negro, where approximately 8 million tons (7.26 million metric tons) per year is extracted from the ocean through evaporation (ParksWatch 2004). The main threat posed by salt mining is the byproducts created by high salt concentrations (Geo-Mexico 2012).

In 1995, two large corporations proposed to expand industrial salt extraction by establishing a plant on the shores of San Ignacio Lagoon, Mexico. International and national concern arose as to whether the then-proposed salt plants would divert fresh water from pumping, produce and discharge toxic brine and other water-based pollutants into the lagoon waters, and spur further development, among other issues, potentially having adverse effects on the ecosystem and gray whales (e.g., Sullivan 2006). At the 52nd meeting of the IWC, Urbán-Ramírez (2000) reported the results of a study on the proposed saltworks project. In particular, he evaluated potential impacts on the gray whales that use this wintering area for breeding, calving, and calf rearing. According to his study results, the salt facility in San Ignacio would not harm gray whales. Nonetheless, on March 2, 2000, the government of Mexico cancelled the saltworks project.

Conservation agreements negotiated between the Laguna San Ignacio Conservation Alliance and communal landowners have since placed 120,000 acres of land around the lagoon in a private land trust, and more agreements are anticipated (Sullivan 2006). Thus, while the local people fish and provide ecotourism and whale-watching, it is reasonable to assume that the area will remain a sanctuary for wintering gray whales (Sullivan 2006).

Shore-Based Commercial Development in Bahia Magdalena

The growth of gray whale tourism in the North Zone of Bahía Magdalena has led to a proposed Japanese-owned and financed tourist resort development at Bahía Magdalena (Dedina and Young 1995). Although NMFS identified this activity as a potential threat to the whales and their habitat in its 1999 gray whales status review (e.g., water quality degradation, increase in whale-watching tourism, etc.), there are currently no plans to proceed with this development (Rugh et al. 1999). In response to the popularity of whale watching as a tourist activity, local communities around Bahía Magdalena have developed local inns, guesthouses, and restaurants (Hoyt and Iñíguez 2008). No information is available about any proposals for large-scale shore-based commercial development in the area.

3.4.3.6.8 Ship Strikes

The nearshore migration route used by gray whales makes ship strikes a potential source of injury and mortality (Laist et al. 2001). Anecdotal data and strandings recorded by the Marine Mammal Stranding Network provide helpful, but incomplete, data on the occurrence, frequency, and significance of vessel-related whale deaths and injuries (Laist et al. 2001). Laist et al. (2001) suggests that most lethal or severe injuries are caused by large ships 263 feet (80 m) or longer and by ships traveling 14 knots or faster. From 1975 to 1980, there were reports of 12 collisions and 6 confirmed deaths of gray whales off the coast of southern California, and 7 of 489 gray whales stranded between Mexico and Alaska from 1975 to 1989 had apparent propeller injuries (Laist et al. 2001). Ferrero et al. (2000) reported five gray whale mortalities off California from ship strikes from 1993 to 1995, and one ship-strike mortality occurred off Alaska in 1997. Between 1999 and 2003, the California Marine Mammal Stranding Network reported four serious injuries or mortalities of gray whales caused by ship strikes, one each in 1999, 2000, 2001, and 2003 (Angliss and Outlaw 2005).

Based on the photo-identification catalog maintained for gray whales in the winter range, Urbán-Ramírez et al. (2003) reported that an estimated 2 percent (then about 1,600) of the whales had injuries (scars) from impact with a large keel or propeller. Additional mortality from ship strikes probably goes unreported because the carcasses sink at sea (i.e., the whales do not strand), the beached carcasses do not show obvious signs of ship strikes, or the whales may not die when hit (Urbán-Ramírez et al. 2003). It is impossible to quantify the actual mortality of gray whales from this source, and an annual mortality rate of one or two gray whales per year from ship strikes represents a minimum estimate. Consistent with that estimate, Carretta et al. (2014) reported that for the most recent 5-year period, 2007-2011, the total serious injury and mortality of ENP gray whales attributed to ship strikes was 11 animals, or 2.2 whales per year. Most of these reported strikes occurred in California, while three occurred in Washington and one in Mexico. Eight of the whales were reported as dead, while the remainder were reported as having a serious injury. The total serious injury and mortality of gray whales in the area used by PCFG whales (based on season and range) during this same period was one animal with a prorated serious injury value of 0.52 (i.e., equivalent to 0.1 whales per year).

3.4.3.6.9 Incidental Catch in Commercial Fisheries

Most data on human-caused mortality and serious injury of gray whales is from strandings (including at-sea reports of entangled animals alive or dead). Strandings represent only a fraction of actual gray whale deaths (natural or human-caused), as reported by Punt and Wade (2012), who estimated that only 3.9 to 13.0 percent of gray whales that die in a given year end up stranding and being reported. Since 1978, a total of 11 entangled gray whales have been reported within the Makah U&A (NMFS 1995; Scordino and Mate 2011; NMFS 2013a; Carretta et al. 2014). Of the five animals entangled in the past 20 years, only one is known to have died and been used by the Tribe (NMFS 1995). When entangled whales are sighted in the Makah U&A, tribal biologists typically work with other researchers and agencies (e.g., NMFS and the Cascadia Research Collective) to disentangle the animals. The Makah Tribe has assisted in several recent disentanglement efforts, including help with two humpback whales in 2008 and 2010 (Cascadia Research Collective 2008; Cascadia Research Collective 2010a) and the successful disentanglements of gray whales in 2009 and 2013 (NMFS 2013a).

The following information comes from NMFS’ 2011, 2012, and 2013 stock assessment reports (Allen and Angliss 2011; Carretta et al. 2013; Carretta et al. 2014). NMFS recognizes 22 commercial fisheries in Alaska that use trawl, longline, or pot gear and that could have incidental serious injuries or mortalities of gray whales. No observed serious injuries or mortalities have occurred in any of those fisheries; however, observers have not been assigned to most Alaska gillnet fisheries, including those in Bristol Bay known to interact with gray whales. Because of a lack of observer programs, mortality data from Canadian commercial fisheries is not available. Baird et al. (2002) estimated the annual mortality in Canadian fisheries to be around two whales.

NMFS observers monitored the Makah tribal set gillnet fishery from 1990 to 1998 and in 2000, reporting one gray whale taken in 1990 and one in 1995. One gray whale was entangled in a set gillnet during the 1995 fishery and was used by the Tribe after it died (NMFS 1995), while another whale entangled in the 1996 fishery was released alive (Hill and DeMaster 1998).[66] In recent years, this set gillnet fishery has been reduced considerably and is currently restricted to the Strait of Juan de Fuca (Makah Fisheries Management 2012). NMFS observers monitoring the California/Oregon thresher shark/swordfish drift gillnet fishery from 2006 to 2011 and the California set gillnet halibut fishery in 2006, 2007, and 2010 did not observe any entangled gray whales, but there have been recent sightings of free-swimming gray whales entangled in gillnets (Carretta et al. 2014).

Carretta et al. (2014) summarized the human-caused mortality and serious injury resulting from unknown fishery sources (predominantly pot/trap or net fisheries) for the most recent 5-year period of 2007 to 2011. Total observed human-caused fishery mortality for ENP gray whales during this period was 12.25 animals or 2.45 whales per year. Total observed human-caused fishery mortality and serious injury in the area used by PCFG whales (based on season and range) for the same period was one animal, or 0.15 whales per year.

3.4.3.6.10 Marine Energy Projects

In recent years, interest in projects that generate electricity from waves or directly from the flow of water in ocean currents, tides, or inland waterways has grown. Broadly, the technologies developed for this purpose are categorized as wave energy converters (e.g., buoys that translate vertical motion into energy) or rotating devices (e.g., underwater turbines).

WDFW (2006b) identified preliminary potential impacts of such projects to birds, fish, and marine mammals. They include, but are not limited to, direct mortality or injury from turbine blade strikes, interference with migratory patterns, measures to protect equipment from marine growth, direct habitat loss from equipment and infrastructure placement, impacts on currents, changes in water surface elevations, effects on commercial and recreational fishing areas and equipment, changes in sediment transport, and other issues not yet identified. In August 2012, the Federal Energy Regulatory Commission (FERC 2012) issued a 35-year license for a 10-buoy, 1.5-megawatt wave energy project approximately 2.9 miles (4.6 km) off the Pacific coast near Reedsport, Oregon. In a review of the project, NMFS (2012b) determined that construction and

[66] Another gray whale was found entangled in a tribal set gillnet in 2009 and swam away during disentanglement attempts (Scordino and Mate 2011; Carretta et al. 2014).

installation of the buoy array would not result in any harassment or take of marine mammals that may be found in the area and are listed under the Endangered Species Act (specifically Southern Resident killer whales and humpback whales). In 2013, the licensee (Ocean Power Technologies) announced that the Reedsport project was being suspended because of regulatory, financial, and other considerations (Ocean Power Technologies 2013), and the project was abandoned in 2014 (Hunt and Cardwell 2014).[67]

In March 2014, the FERC issued a 10-year pilot license for a proposed 600-kilowatt tidal project to be located in Puget Sound's Admiralty Inlet (FERC 2014a). The project (which in September 2014 was unlikely to move forward due to funding constraints; Snohomish Public Utilities District 2014) was intended primarily to be a research site to assess the commercial viability of tidal energy generation (using two tidal power turbines) and expected to operate for just 3 to 5 years. In reviewing the project, NMFS (2013b) determined that the proposed action was not likely to jeopardize the continued existence of ESA-listed marine species (including Southern Resident killer whales and humpback whales) nor likely to result in the destruction or adverse modification of designated critical habitat. In that review, NMFS also noted that any future development of this tidal energy project beyond the 10-year license period would be subject to separate review and authorizations.

In addition to the Reedsport and Admiralty Inlet projects, the FERC is either considering or has issued preliminary permits for several proposed wave or tidal energy projects in California, Oregon, Washington, and Alaska (FERC 2014b; FERC 2014c; PFMC 2013a). Such permits allow developers to study the feasibility of proposed projects, but they do not authorize project construction. The number of turbines or buoys associated with each project is not known, but anticipated energy output (in megawatts) indicates the relative size of each project. As of May 2014, a preliminary permit had been issued for one wave project (Yakutat Alaska in the Gulf of Alaska) and preliminary permits were pending for the following projects located in or immediately adjacent to coastal waters of the U.S. west coast in areas that some gray whales could potentially travel:

California

[67] In April 2014, FERC identified an additional project—the Pacific Marine Energy Test Center South Energy Test Site Wave Test Center—that was in pre-filing status but could see deployment in nearshore coastal waters southwest of Newport, Oregon in 2017 if funding is secured (FERC 2014d; Coonrod 2014).

- San Onofre Ocean Wave Electricity Generation Electricity Farm; 2,000 megawatts (Preliminary Permit Pending)
- Purisima Point Wave Park; 500 megawatts (Preliminary Permit pending)
- Morro Bay Wave Park; 100 megawatts (Preliminary Permit pending)
- Point Estero Wave Park; 650 megawatts (Preliminary Permit pending)
- Estero Bay Wave Park; 650 megawatts (Preliminary Permit pending)

Oregon

- Reedsport OPT Wave Park Project; 1.5 megawatts (License issued but project recently abandoned)
- Pacific Marine Energy Test Center South Energy Test Site Wave Test Center; 20 megawatts (Pre-filing for License)

Washington

- Admiralty Inlet Tidal Energy Project; 1 megawatt (Pilot License issued, but project likely to be abandoned)

Alaska

- East Foreland Tidal Energy Project, Cook Inlet; 5 megawatts (Preliminary Permit issued)

In December of 2007, FERC issued a license for a pilot wave energy project in Makah Bay, located in the Makah U&A, within the gray whale's migratory corridor. In 2009, the licensee surrendered the license, stating that the project had become uneconomical (HydroWorld 2009). In addition to this project, there are at least 30 others originally considered for placement along the Washington, Oregon, and California coasts that are now classified as defunct (PFMC 2013b).

3.4.3.6.11 Climate Change and Ocean Acidification

As reported in the most recent NMFS stock assessment report (Carretta et al. 2014), there is growing evidence indicating that the arctic climate is changing significantly, and these changes are likely to affect gray whales. For example, Wang and Overland (2009 and 2012) reviewed several climate models to predict that the Arctic could be nearly free of summer sea ice sometime in the 2030s. With the increase in numbers of gray whales (Rugh et al. 2005), in combination with changes in prey distribution (Grebmeier et al. 2006; Moore et al. 2007) and a reduction in the extent of sea ice cover in some regions (Johannessen et al. 2004), some gray whales have moved into new feeding areas, spreading their summer range (Rugh et al. 2001). Laidre et al.

(2008) surmised that for gray whales and other species that feed in the Arctic during the summer, animals may start to arrive farther north at progressively earlier dates and compete directly with those species that live year-round in the Arctic. These authors developed an index of sensitivity of Arctic marine mammals to climate-induced change; species that were most sensitive included those that relied on sea ice and specialized feeding adaptations, such as polar bears and narwhals. Gray whales are considered to be more opportunistic foragers (Moore and Huntington 2008), and long-term impacts on them may be more mixed (Ragen et al. 2008).

Bluhm and Gradinger (2008) examined the availability of pelagic and benthic prey in the Arctic and concluded that pelagic prey is likely to increase while benthic prey is likely to decrease in response to climate change. They noted that marine mammal species that exhibit trophic plasticity (such as gray whales, which feed on both benthic and pelagic prey) will adapt better than trophic specialists. Moore and Huntington (2008) assessed the impacts of climate change on the resilience of Arctic marine mammals and observed that "gray whales are perhaps the most adaptable and versatile of the mysticete species." They further noted that gray whales are dynamic and opportunistic foragers and cited recent and unexpected observations that some animals remain in northern waters (including the Beaufort Sea) year round. In their review of reported climate change impacts on gray whales, Salvadeo et al. (2013) cited the following as likely gray whale responses to global warming:

- Fewer whales in the Gulf of California.
- Increased numbers of mothers with calves along the California coast.
- Winter occurrence of whales on their feeding areas.
- Recolonization of the Atlantic Ocean by gray whales.
- Decrease in whale numbers in the breeding lagoons.

Rising levels of carbon dioxide are expected to increase ocean acidification which in turn could also cause changes in the abundance and types of shell-forming organisms[68] (Fabry et al. 2008; Hall-Spencer et al. 2008), many of which are important in the gray whales' diet (Nerini 1984; Moore and Huntington 2008). Atmospheric carbon dioxide levels are currently rising at a rate roughly 100 times faster than at least the past 420,000 years, and approximately half of the anthropogenic CO_2 produced in the past 200 years has been absorbed by the oceans (Royal Society 2005). In 2005, the Royal Society convened a working group of international experts to

[68] The reaction of carbon dioxide with seawater reduces the availability of carbonate ions that calcifying prey organisms like amphipods need to create shells.

produce a report on ocean acidification as a result of increasing atmospheric carbon dioxide. One of the main conclusions regarding impacts on marine species was that:

> *"Organisms will continue to live in the oceans wherever nutrients and light are available, even under conditions arising from ocean acidification. However, from the data available, it is not known if organisms at the various levels in the food web will be able to adapt or if one species will replace another. It is also not possible to predict what impacts this will have on the community structure and ultimately if it will affect the services that the ecosystems provide. Without significant action to reduce CO_2 emissions into the atmosphere, this may mean that there will be no place in the future oceans for many of the species and ecosystems that we know today. This is especially likely for some calcifying organisms."*

Global climate change is also likely to increase human activity in the Arctic as sea ice decreases, including oil and gas exploration and shipping (Hovelsrud et al. 2008). Such activity will increase the chance of oil spills and ship strikes in this region. Gray whales have demonstrated avoidance behavior to anthropogenic sounds associated with oil and gas exploration (Malme et al. 1983; 1984) and low-frequency active sonar during acoustic playback experiments (Buck and Tyack 2000; Tyack 2009). Recently, some oceanographers (Hester et al. 2008; Brewer and Hester 2009) have reported that an unanticipated consequence of ocean acidification is a significant decrease in sound absorption because of various chemical interactions, in particular those involving forms of boron. The result is a "noisier ocean" where sounds travel farther, especially low frequency sounds used by marine mammals. These researchers reported that sound already may be traveling 10 percent farther in the oceans than it did a few hundred years ago and that it remains to be seen how marine mammals will adapt to the greater background noise. In contrast to these reports, subsequent modeling by Udovydchenkov et al. (2010) yielded results indicating that changes may be minimal; a few decibels of increase may occur in 100 years in some very quiet areas very far from noise sources, with small effects closer to noise sources.

3.4.3.6.12 Marine Debris

A substantial body of evidence documents the deleterious effects of marine plastic debris on marine biota, including whales (EPA 2011b; IWC 2013b). In 2013, the IWC held a Marine Debris Workshop to address the impacts of marine debris on cetaceans and their habitat (IWC 2013b). Eastern North Pacific gray whales were one of three species considered a priority for research to determine the severity and location of impacts on individual whales and whale populations.

The most common threats of marine debris to whales are ingestion and entanglement (EPA 2011b) in debris that has settled on the sea floor or accumulated at or near the water's surface. Gray whales can ingest debris while foraging or swimming. For example, a gray whale that stranded in West Seattle in April 2010 was found to have ingested a variety of manmade objects, including plastic bags, small towels, surgical gloves, sweat pants, plastic pieces, duct tape, and a golf ball (Cascadia Research Collective 2010b), but is not known if the items contributed to the death of the whale. Foraging gray whales can also inhale low-density plastics that become airborne at the water's surface (IWC 2013b). Problems associated with the ingestion of plastics by whales include the development of internal and external wounds, impairment of feeding capacity because of the buildup or blockage of the digestive system, decreased mobility and predator avoidance, and toxicity (Gregory 2009; EPA 2011b).

Marine plastic debris in particular is a widespread problem, making up 50 to 80 percent of beach litter, floating marine debris, and waste on the sea floor (Barnes et al. 2009). In 2012, more than 300 million tons of plastic were produced globally, less than half of which was recycled or consigned to landfills (Rochman et al. 2013). Large patches of plastic debris have been observed in the North Pacific Ocean where currents form a gyre that collects floating materials (EPA 2011b). Studies based on satellite-derived information and ocean circulation models, and confirmed by flight observations, show that the largest debris concentration in the North Pacific occurs along a southwest-to-northeast line north of the Hawaiian Islands between 23°N and 37°N latitude (EPA 2011b). The distribution of marine debris is also dependent on the distribution of sources (e.g., urban areas, tourist beaches, shipping routes, fishing grounds) and oceanographic processes (IWC 2013b). For example, microplastics (i.e., plastic particles smaller than 0.04 inch [1 mm]) are 2.5 times more abundant in coastal marine areas that receive sewage compared to areas that do not (Browne et al. 2011).

The potential toxicity of plastic debris is a growing concern (NOAA 2011b). Pollutants in seawater adhere to and become concentrated on small particles of plastic (Ashton et al. 2010; Rios et al. 2010; Andrady 2011), which can subsequently be ingested or inhaled by whales. Mato et al. (2001) found the concentration of PCBs on plastic resin pellets to be 100,000 to 1,000,000 times that of surrounding waters. Other pollutants that may be concentrated on plastic debris include polyethylene, polypropylene, phthalates, and other persistent organic pollutants (IWC 2013b). Persistent organic pollutants are synthetic organic compounds that have a wide range of chronic effects, including endocrine disruption, mutagenicity, and carcinogenicity (Rios et al. 2007). Furthermore, these pollutants are chemically stable, meaning they are not easily degraded in the environment or in organisms (Rios et al. 2007). The impacts on baleen whales of ingesting toxins in plastic debris are largely unknown. However, the presence of phthalates in the blubber of stranded fin whales in the Mediterranean Sea provides evidence for the consumption and metabolism of plastics by cetaceans (Fossi et al. 2012; IWC 2013b).

In addition to ingesting or inhaling small particles of marine debris, gray whales can become entangled in larger debris. Debris such as derelict fishing gear (e.g., nets, rope, monofilament fishing line, traps, pots, floats, buoys) can entangle and injure animals or interfere with their ability to pursue food. As noted in Subsection, 3.4.3.6.9, Incidental Catch in Commercial Fisheries, and Subsection 3.10.3.5.2, Makah Subsistence Consumption, gray whales encounter and sustain injury from a variety of fishing gear, including derelict gear. Gray whales and humpback whales are the most commonly reported entangled large whale species along the U.S. west coast (IWC 2013b; Saez et al. 2013). Whale entanglements on the U.S. west coast are reported from opportunistic on-water sightings (e.g., NOAA's 1-800-SOS-Whale reporting hotline), stranding records, and commercial fishery observers, but there is no formal reporting infrastructure for entanglements (IWC 2013b). As a result, and in light of the cryptic nature of entanglement events, the numbers of entanglements are likely underreported (Read et al. 2006; IWC 2013b). Based on reported observations of mortality and serious injury from entanglement in fishing gear from 2007 to 2011, Carretta et al. (2014) estimated that 2.45 gray whales are killed or seriously injured by interactions with fishing debris each year. Some of the strandings reported in Subsection 3.4.3.1.7, Strandings, may be related to marine debris, but for most whales the cause of death is unknown. Notably, of 48 marine mammals found dead in derelict gillnets recovered from Puget Sound and the U.S. portions of the Strait of Juan de Fuca and Strait of Georgia from 2002 through 2013, none were gray whales (Northwest Straits Foundation 2013).

On March 11, 2011, a devastating 9.0 earthquake and tsunami struck Japan, causing significant loss of life and property and washing out an estimated 5 million tons of debris into the North Pacific Ocean. While most of the debris sank near Japan, approximately 30 percent floated away and is expected to wash up on U.S. and Canadian shores over the next several years (NOAA 2013a,b). Debris items have made landfall in Alaska, Washington, Oregon, California, Hawaii, and British Columbia. It is unlikely that debris from the tsunami will enter the Strait of Georgia due to surface water properties and currents at the mouth of the Strait of Juan de Fuca (Canadian Science Advisory Secretariat 2012).

To date there have been approximately 1,900 debris sighting reports coming to the NOAA reporting and tracking system, with 67 percent of reports from shore-based observations (NOAA

2015). Several items found have confirmed connections to the Japan tsunami, including vessels, buoys, sports balls, floating piers, and a motorcycle in a container. Other types of debris that could wash up include buoyant items, such as fishing nets, lumber, or cultural items. Most debris will likely consist of small pieces rather than large objects or debris fields owing to the effects of surface currents, winds, and waves (Canadian Science Advisory Secretariat 2012). Because marine debris is a persistent problem originating from many sources around the Pacific, it’s very difficult to tell where debris came from without unique identifying information.

NOAA anticipates that in North Pacific winds and currents will cause marine debris of mixed types to wash ashore intermittently along the Pacific coastline of North America (as well as Hawaii) for years to come (NOAA 2013b). These expectations are based on general debris behavior, model outputs, and patterns in at-sea sightings reports that all point to debris being widely dispersed over large areas. Tsunami debris teams and task forces have been established along the west coast for incident preparedness and response, public safety, cleanup, and public outreach to address marine debris affecting coastline (e.g., Canadian Science Advisory Secretariat 2012; State of Oregon 2012; State of Washington 2012).

3.5 Other Wildlife Species

3.5.1 Introduction

Various marine mammals and birds inhabit the project area, with the highest use during late spring through early fall and the lowest use during winter (NOAA 1993). Thirty species of marine mammals and 109 species of marine birds have been recorded in the project area (NOAA 1993). Of these species, eight mammal and two bird species are listed under the ESA as threatened or endangered. Four federally listed reptiles (leatherback sea turtles, green sea turtles, loggerhead sea turtles, and olive ridley sea turtles) also could occur in the area (Plotkin 1995). Species occurring in the project area and listed as threatened or endangered by Washington State, but not under the federal ESA, include one marine mammal (sea otter).

3.5.2 Regulatory Overview

Various federal, state, and local regulations address the protection of threatened, endangered, and sensitive wildlife in the project area. Table 3-15 lists regulations for wildlife. In most cases, city and county regulations reflect WDFW recommendations. For a detailed description of NMFS’ management of marine mammals (including, but not limited to, gray whales), see Subsection 3.4.2.1, Marine Mammal Protection Act Management.

With regard to disturbance of marine wildlife, MMPA prohibits (with some exceptions) the harassment of marine mammals in United States waters. The 1994 amendments to the MMPA defined harassment (Level B) as any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. Loud, continued noises could be considered harassment to wildlife, particularly to marine mammals that use sound to communicate.

To protect nesting seabirds and marine mammals from noise and physical disturbance from low-flying aircraft, OCNMS prohibits flying motorized aircraft less than 2,000 feet (610 m) over certain areas of the Sanctuary. These restrictions are described in greater detail in Subsection 3.1.1.1.2, Designation [of the OCNMS] and Regulatory Overview. The restrictions were finalized with a final rule published by the National Oceanic and Atmospheric Administration (77 Fed. Reg. 3919, January 26, 2012). In addition, the Sanctuary has made increasing voluntary compliance with this regulation a major priority (Galasso 2005). Notably, data collected by University of Washington researchers studying marine birds at Tatoosh Island were used to conduct an enforcement action against a helicopter pilot and contracting passenger (Parrish et al. 2005).

1 Table 3-15. Federal, state, and local regulations for protected wildlife.

Regulation	Overseeing Agency	Wildlife Species and Habitats Addressed
Federal		
Marine Mammal Protection Act (MMPA)	NMFS and USFWS	All marine mammal species.
Whaling Convention Act (WCA)	NMFS	All cetacean species.
Endangered Species Act (ESA)	USFWS and NMFS	All federally listed threatened and endangered species and critical habitats. Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.
Migratory Bird Treaty Act and Executive Order 13186	USFWS	Most migratory birds. The act provides that it is unlawful to pursue, hunt, take, capture, or kill these birds.
Bald Eagle Protection Act and Eagle Protection Act	USFWS	Bald eagle (and golden eagle). The act prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions.
Olympic Coast National Marine Sanctuary regulations, 15 CFR Part 922, Subpart O	NOAA, National Marine Sanctuary Program	Marine mammals, sea turtles, seabirds, and their habitats. The regulations prohibit take of these wildlife, except as authorized by the ESA, MMPA, Migratory Bird Treaty Act, or pursuant to any relevant Indian treaty, provided that the treaty is exercised in accordance with the ESA, MMPA, and Migratory Bird Treaty Act, to the extent that they apply. These regulations prohibit flying motorized aircraft at less than 2,000 feet (610 m) elevation both above the sanctuary and within 1 nautical mile (1.9 km) of the Flattery Rocks National Wildlife Refuge or within 1 nautical mile (1.9 m) seaward from the coastal boundary of the sanctuary, with limited exceptions.
State		
Washington State Endangered Species Act, Washington Administrative Code 232-12-297	WDFW	All state-listed threatened, endangered, and 'state sensitive' species. Associated recovery plans provide guidelines on management of these species.
Local		
Clallam County Critical Areas Ordinance No. 709, 2001	Clallam County	Habitat for threatened, endangered, and other sensitive species. Provides general guidance. Also provides specific buffers for bridge construction and other projects that are not relevant to the Makah EIS proposed action.

3.5.3 Existing Conditions

The following discussion is divided into three primary topics. It focuses on establishing a baseline of information for addressing EIS issues of concern including noise, disturbance, and other perturbations that may affect marine wildlife. Subsection 3.5.3.1 describes the marine mammal species that are known to occur in the project area. Subsection 3.5.3.2 provides an overview of other marine wildlife species in the project area. Both sections address ESA-listed species as well as other species in the project area. Subsection 3.5.3.3 discusses the sensitivity of marine mammals and other wildlife species to noise and other disturbance both above and below the surface of the water.

3.5.3.1 Marine Mammals

Table 3-16 lists 30 species of marine mammals that breed, rest within, or migrate through the waters off the Washington coast (NMFS 1992b; NOAA 1993). Descriptions of the state and federal threatened or endangered species followed by common and then, to a lesser extent, uncommon species are provided in this section. Full descriptions of these species are in Allen and Angliss (2013), Carretta et al. (2014), Forney et al. (2000), NMFS (1992), Ferrero et al. (2000), Haley (1986), Perrin et al. (2002), and Nowak et al. (2003), with specific information on their use off the Washington coast by Brueggeman et al. (1992), Calambokidis et al. (2004b), Green et al. (1993), Jeffries et al. (2012), and Oleson et al. (2009).

Table 3-16. Marine mammals that occur along the Washington coast and their federal/state status.

Species	Scientific Name	Occurrence	Primary Habitat	Primary Prey	Season(s) Present	Federal/ State Status
Harbor seal	*Phoca vitulina*	Common	Coastal/ continental	Fish	Year-round	
California sea lion	*Zalophus californianus*	Common	Coastal/shelf	Fish	Summer/ spring	
Steller sea lion	*Eumetopias jubatus*	Common	Coastal/shelf	Fish	Year-round	Federally delisted
Northern elephant seal	*Mirounga angustirostris*	Common	Shelf/slope	Fish/squid/ crab	Summer/fall	
Northern fur seal	*Callorhinus ursinus*	Common	Offshore/ slope	Fish/squid	Year-round	Federally depleted
Guadalupe fur seal	*Arctocephalus townsendi*	Uncommon	Offshore/ slope	Fish/squid	Year-round	Federally threatened
Dall's porpoise	*Phocoenoides dalli*	Common	Shelf/slope/ offshore	Fish	Year-round	
Harbor porpoise	*Phocoena phocoena*	Common	Shelf	Fish/squid	Year-round	
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	Common	Slope/ offshore	Fish	Year-round	
Northern right whale dolphin	*Lissodelphis borealis*	Common	Slope/ offshore	Fish/squid	Year-round	
Common dolphin	*Delphinus delphis*	Rare	Offshore	Squid/fish	Unknown	
Striped dolphin	*Stenella coeruleoalba*	Rare	Shelf/offshore	Fish/squid/ zooplankton	Unknown	
Risso's dolphin	*Grampus griseus*	Common	Slope	Squid	Year-round	
Killer whale[1]	*Orcinus orca*	Common	Shelf/slope	Fish/marine mammals	Year-round	Federally/state endangered[1]
False killer whale	*Pseudorca crassidens*	Rare	Offshore	Fish	Unknown	
Pilot whale	*Globicephala macrorhynchus*	Rare	Shelf/offshore	Fish/ octopus	Unknown	
Pygmy sperm whale	*Kogia breviceps*	Rare	Offshore	Octopus/ fish/squid	Unknown	

Species	*Scientific Name*	Occurrence	Primary Habitat	Primary Prey	Season(s) Present	Federal/ State Status
Gray whale[2]	*Eschrichtius robustus*	Common	Coastal/shelf	Crustaceans	Year-round	WA sensitive; ENP = Federally delisted; WNP = Federally endangered[2]
Humpback whale	*Megaptera novaeangliae*	Common	Shelf/slope	Zooplankton/ fish	Spring to fall	Federally/state endangered
Sperm whale	*Physeter macrocephalus*	Common	Slope/ offshore	Squid/fish	Spring to fall	Federally/state endangered
Minke whale	*Balaenoptera acutorostrata*	Uncommon	Shelf	Fish/squid	Year-round	
Fin whale	*Balaenoptera physalus*	Uncommon	Slope/ offshore	Fish/ zooplankton	At least winter	Federally/state endangered
Blue whale	*Balaenoptera musculus*	Rare	Slope/ offshore	Zooplankton	Unknown	Federally/state endangered
Sei whales	*Balaenoptera borealis*	Rare	Offshore	Zooplankton	Unknown	Federally/state endangered
Right whale	*Balaena glacialis*	Rare	Shelf	Zooplankton	At least spring	Federally/state endangered
Baird's beaked whale	*Berardius bairdii*	Rare	Shelf/offshore	Squid/ octopus/fish	At least fall	
Curvier beaked whale	*Ziphius cavirostris*	Rare	Offshore	Squid/fish	Unknown	
Hubb's beaked whale	*Mesoplodon carlhubbsi*	Rare	Offshore	Squid/fish	Unknown	
Stejneger's beaked whale	*Mesoplodon stejnegeri*	Rare	Offshore	Squid/fish	Unknown	
Sea otter (Washington stock)	*Enhydra lutris kenyoni*	Common	Coastal	Invertebrates	Year-round	State endangered

[1] NMFS has listed the Southern Resident killer whale population as endangered. Transient and offshore killer whales are not listed under ESA, but occur in the project area.

[2] The ENP stock of gray whales – the subject of the Makah waiver request – was delisted in 1994. The WNP stock is currently listed as endangered under the ESA and depleted under the MMPA (refer to Subsections 3.4.3.2.4, WNP Status, Carrying Capacity, and Related Estimates and 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates).

Source: Haley 1986; Calambokidis et al. (2004b); Brueggeman et al. (1992); NMFS (1992); Green et al. (1993); Carretta et al. (2006); Anglis and Outlaw (2005); Ferrero et al. (2000); Forney et al. 2000; Carretta et al. (2014).

3.5.3.1.1 ESA-listed Marine Mammal Species

Killer Whale

There are three ecotypes of killer whales in the North Pacific Ocean: resident, transient, and offshore whales (Bigg et al. 1990; Ford et al. 2000). Resident killer whales (Northern and Southern ecotypes) congregate in relatively large groups in coastal areas where they forage primarily on fish. Transient killer whales, whose range extends over a broader area, primarily hunt marine mammals (Krahn et al. 2004; Baird et al. 1992). Three transient killer whale stocks are recognized within the Pacific U.S. EEZ: 1) the Gulf of Alaska, Aleutian Islands, and Bering Sea transient stock, occurring primarily from Prince William Sound through the Aleutian Islands and Bering Sea; 2) the AT1 transient stock, occurring in Alaska from Prince William Sound through the Kenai Fjords; and 3) the West Coast transient stock, occurring from California through southeast Alaska (Allen and Angliss 2013). The West Coast Transient stock has a minimum population estimate of 354 animals, with a PBR of 3.5 animals (Allen and Angliss 2013). Transient pods are usually smaller than resident pods, and they typically have different dorsal fin shapes and saddle patch pigmentation than resident pods. Little is known about offshore killer whales, but their groupings are large. They range from Mexico to Alaska and are presumed to feed primarily on fish (Ford et al. 2000; Krahn et al. 2002; Krahn et al.2004). All three ecotypes of killer whales, including Southern and Northern Residents, were seen each year during ship surveys and detected at acoustic monitoring sites off the outer coast of Washington from August 2004 through September 2008 (Oleson et al. 2009). Oleson et al. (2009) reported 6 sightings of 51 animals; all of these sightings had fewer than 15 animals. More recently, killer whales (Southern Residents and transients) were encountered off Washington State during small boat surveys conducted in the spring of 2011 and 2012 (Jeffries et al. 2012). They reported 2 sightings of 13 animals in 2011, and 3 sightings of 9 animals in 2012. Killer whales were widely distributed across different habitats; animals were sighted both close to and far from shore and in fairly shallow and deep water.

As summarized by Carretta et al. (2014), most sightings of the Eastern North Pacific Southern Resident stock of killer whales have occurred in the summer in inland waters of Washington and southern British Columbia. Pods belonging to this stock have, however, also been sighted in coastal waters off southern Vancouver Island and Washington (Bigg et al. 1990; Ford et al. 2000). The complete winter range of this stock is uncertain, but recent acoustic studies indicate that these killer whales may be found during the winter and early spring along the entire west coast from Cape Flattery, Washington, to Point Reyes, California (Hanson et al. 2013). Of the three pods that compose this stock, one (J1) is commonly sighted in inshore waters in winter, while the other two

(K1 and L1) apparently spend more time offshore (Ford et al. 2000). Pods K1 and L1 are often seen entering the inland waters of Vancouver Island from the north (through Johnstone Strait) in the spring (Ford et al. 2000), suggesting that they may spend time along the entire outer coast of Vancouver Island during the winter. In 1993, the three pods composing this stock totaled 96 killer whales (Carretta et al. 2013). The population increased to 99 whales in 1995, then declined to 79 whales in 2001, and recently numbered 85 whales in 2012 (Ford et al. 2000; Carretta et al. 2014). The minimum population estimate for the eastern North Pacific Southern Resident stock of killer whales is 85 animals with a PBR of 0.14 whales per year (Carretta et al. 2014). The Southern Residents primarily feed on salmon returning to rivers in Washington and southern British Columbia.

NMFS listed the Southern Resident killer whale distinct population segment as endangered in 2005 (70 Fed. Reg. 69903, November 18, 2005). Listing factors included reduced quantity and quality of prey, persistent pollutants that could cause immune or reproductive system dysfunction, oil spills, and noise and disturbance from vessel traffic. Additionally, the small size of this stock makes it potentially vulnerable to inbreeding that could cause a major population decline (70 Fed. Reg. 69903, November 18, 2005). In November 2006, NMFS designated critical habitat for the Southern Resident killer whales (71 Fed. Reg. 69054, November 29, 2006). This designation includes approximately 2,500 square miles (6,475 sq. km) of Puget Sound, including the entire Strait of Juan de Fuca in the project area. Areas with water less than 20 feet (6.1 m) deep are not included in the designation. The primary constituent elements for the Southern Resident killer whale critical habitat are 1) water quality to support growth and development; 2) prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and 3) passage conditions to allow for migration, resting, and foraging. On April 25, 2014, NMFS accepted a petition to revise the critical habitat designation (79 Fed. Reg. 22933).

Humpback Whale

The humpback whale is listed as endangered throughout its range (35 Fed. Reg. 8491, June 2, 1970). Three North Pacific Ocean populations of humpback whales are currently recognized, based on predominant migration patterns and destinations (there is no perfect correlation between the breeding and feeding areas): 1) the California/Oregon/Washington stock, which spends winter and spring in coastal Central America and Mexico, then migrates to the coast of California and to southern British Columbia in summer and fall; 2) the central North Pacific stock, which spends winter and spring off the Hawaiian Islands, then migrates to northern British

Columbia/Southeast Alaska and Prince William Sound west to Kodiak in summer and fall; and 3) the western Pacific stock, which spends winter and spring off of Japan, then likely migrates to waters west of the Kodiak Archipelago in summer and fall (Carretta et al. 2013). Other humpbacks also spend winter and spring in the waters of Mexico's offshore islands, but the migratory destination of these whales is not well known. The California/Oregon/Washington population is the stock that most commonly occurs in the project area during summer and fall. Coastal waters off Washington may be an area of mixing between the California/Oregon/Washington stock and a southern British Columbia stock (Carretta et al. 2013). Some individuals from the central North Pacific stock may also appear near or in the project area during the summer and fall, and there is some overlap of this stock with the summer and fall distribution of the California/Oregon/Washington stock.

The minimum population estimate for humpback whales in the California/Oregon/Washington stock is approximately 1,878 whales (Carretta et al. 2013), and is based on the 2007/2008 mark-recapture estimate of 2,043 (Calambokidis et al. 2009b). The population is growing approximately 6 to 7 percent per year, and the calculated PBR for U.S. waters is 11.3 whales per year (Carretta et al. 2013).

Seventeen of 191 whales (9 percent) photo-identified by Calambokidis et al. (2004b) off northern Washington had also been photographed off California and Oregon. Interchange of whales seen off northern Washington and other feeding areas to the south decreased as distance among feeding areas increased. Approximately 10 percent of the whales that were identified off Oregon were also photographed off northern Washington (Calambokidis et al. 2004b).

Humpbacks are generally seen off the coast of Washington from May to November, although they have also been seen earlier in the spring and later in the winter (Shelden et al. 2000) with the highest numbers in June and July. Between 2004 and 2008 off the Washington coast, the winter and spring sightings were further from shore and in deeper waters than those from summer and fall (Oleson et al. 2009). Acoustic detections between 2004 and 2008 occurred from late summer through early winter, with detections peaking during October (Oleson et al. 2009). Aerial surveys conducted by Brueggeman et al. (1992) off the coasts of Oregon and Washington recorded 36 groups of 68 humpbacks between May and November, and Green et al. (1993) reported 50 groups of 77 humpbacks between March and April. Humpbacks primarily occurred near the edge of the continental slope and deep submarine canyons (Astoria, Grays, and Nitinat Canyons) where upwelling concentrates zooplankton near the surface for feeding (Brueggeman et al. 1992). Brueggeman et al. (1992) observed that humpbacks were most abundant off Oregon and

Washington between May and September, but did not observe any during winter and did not sight any calves. Humpbacks typically are not sighted in winter, but Shelden et al. (2000) did observe some off the coast of Washington in late fall and winter 1998 and 1999: 5 humpback whales were sighted between Carroll Island and Cape Flattery in October, 26 humpbacks (in 12 groups) were sighted in November, and 18 humpbacks (10 groups) were sighted in December. Shelden et al. (2000) concluded that the late occurrence of humpbacks in Washington waters could be due to reoccupation of habitat subsequent to commercial whaling, or to abundance of prey available.

Between 2011 and 2012, Jeffries et al. (2012) reported 66 sightings of 102 individuals during ship surveys off the Washington and Oregon coasts. During ship surveys off the Washington coast between 2004 and 2008, Oleson et al. (2009) reported 80 sightings of 147 whales and 68 unique humpback whales were identified. They were most common in waters on the shelf deeper than 164 feet (50 m). Calambokidis et al. (2004b) reported sightings of humpback whales during ship surveys conducted from 1995 to 2002 off the northern Washington coast within the boundaries of the OCNMS. Humpbacks were the most common species seen, with 232 sightings of 402 animals and more than 191 unique individuals; the largest numbers were seen in 2002 when there were 79 sightings of 139 individuals. Group sizes ranged from one to eight animals. Only six calves were recorded from the ship surveys, probably because it was difficult to identify calves at the distance at which most sightings occurred. Sightings were concentrated between Juan de Fuca Canyon and the outer edge of the continental shelf, an area called the Prairie. A small area east of the mouth of Barkley Canyon and north of Nitnat Canyon where the water was approximately 410 to 475 feet (125 to 145 m) deep had numerous sightings in all years. Smaller numbers of humpback whales were also seen on Swiftsure Bank.

Sperm Whale

The sperm whale is listed as endangered throughout its range (35 Fed. Reg. 8491, June 2, 1970). Sperm whales are widely distributed in the pelagic regions of the North Pacific Ocean where they prey on deepwater squid (Gosho et al. 1984). Sperm whales breed in the lower latitudes (south of 40°N) in winter and then migrate northward to summer feeding areas. Whaling records indicate that about eight sperm whales were harvested annually by whalers at the Bay City, Washington whaling station during its 15 years of operation in the early 1900s, suggesting that sperm whales were regularly present off the coast at that time. Ship surveys by Jeffries et al. (2012) from 2011 and 2012, Oleson et al. (2009) from 2004 to 2008, and Calambokidis et al. (2004b) from 1995 to 2002 recorded no sperm whales. However, sperm whales were heard in all months of the year from 2004 to 2008 at the offshore acoustic monitoring station off the outer Washington coast

(Oleson et al. 2009). In surveys Brueggeman et al. (1992) conducted, 24 groups of 36 sperm whales were recorded off the Oregon and Washington coasts. Most were encountered in the deeper offshore waters except for a relatively small number found in continental slope waters. Brueggeman et al. (1992) observed sperm whales during spring through fall, but not in winter. The highest single-day count was 13 sperm whales in September 1990. Green et al. (1993) reported seven sperm whales in five groups off the Oregon and Washington coasts between March and May. The most recent estimate of abundance for the California/Oregon/Washington stock is 971 sperm whales; the minimum population estimate is 751 animals with a PBR of 1.5 whales per year (Carretta et al. 2013). The population abundance for the California/Oregon/Washington stock appears to have been rather variable and does not show any obvious trends. The information indicates that relatively small numbers of sperm whales are present in the deep waters off the Washington coast from spring through fall.

Fin Whale

The fin whale is listed as endangered throughout its range (35 Fed. Reg. 8491, June 2, 1970). Three stocks are generally recognized off the United States west coast: the California/Oregon/Washington stock, the Hawaii stock, and the Alaska stock (Carretta et al. 2013). Fin whales of the California/Oregon/Washington stock are year-round residents off the coast of California; they summer off the Oregon coast and may pass by the Washington coast. They are a pelagic species, seldom found in waters shallower than 656 feet (200 m). During 2011 and 2012 ship surveys off the Washington and Oregon coasts, Jeffries et al. (2012) reported seven sightings of 13 animals. From 2004 to 2008, Oleson et al. (2009) reported one sighting of two animals along the outer Washington coast during ship surveys. Ship surveys by Calambokidis et al. (2004b) from 1995 to 2002 indicated no fin whales. Aerial surveys Brueggeman et al. (1992) conducted off the Oregon and Washington coasts indicated 13 groups of 27 fin whales between June and January. All of the fin whales were observed off the Oregon coast, with all but five whales in waters on the continental slope (656 to 6,562 feet [200 to 2,000 m] deep). The whales that were not observed in continental slope waters included two seen about 124 miles offshore in November and three viewed on the continental shelf just south of the Columbia River in January. The former group was traveling south, suggesting they were migrating back to the wintering grounds. Except for these two groups of whales, all the other whales were observed during June and July. No calves were observed with any of the whales. Green et al. (1993) reported sighting two fin whales during aerial surveys off the coast of Oregon and Washington between March and May in 1992, but did not report the location. An estimated 3,044 fin whales occur off the coasts of California, Oregon, and Washington during summer and fall, based on shipboard surveys in

2005 by Forney (2007) and in 2008 by Barlow (2010). The minimum population estimate from the 2005 and 2008 surveys was 2,624 with a PBR of 16 whales per year (Carretta et al. 2013). Fin whales can be distinguished from other mysticetes (baleen whales, such as gray, humpback, sei, bowhead, and fin whales) by distinct coloration on the head. The pigmentation differs on the left side and right side, as well as on the dorsal and ventral surface. On the left side, both the dorsal and ventral surfaces are dark slate. On the right side, the dorsal surface is gray and the ventral surface is white (Aguilar 2002). Fin whales in the northern hemisphere typically feed on small schooling fish, planktonic crustaceans, small squid, and zooplankton (Aguilar 2002; Nowak 2003). Based on the Oregon sightings near Washington, it is possible that relatively small numbers of fin whales pass through coastal Washington waters during winter while migrating south.

Blue Whale

Blue whales are the largest animal, with recorded lengths of 104 to 107 feet (31.7 to 32.6 m). Females are typically larger than males, and southern hemisphere whales are larger than those of the northern hemisphere (the largest recorded was 92 feet [28 m]) (Sears 2002). The species is listed as endangered under the ESA (35 Fed. Reg. 8491, June 2, 1970) throughout its range. Three stocks of blue whales inhabit United States waters: the western North Atlantic stock, the Hawaiian stock, and the eastern North Pacific stock. The eastern North Pacific stock feeds in California waters in summer and fall (from June to November) and migrates south to productive areas off Mexico and as far south as the Costa Rica Dome in winter and spring (Carretta et al. 2013). Blue whales are very rarely seen off the Oregon coast, but there have been recent sightings off the Washington coast (Calambokidis and Barlow 2004; Calambokidis et al. 2004b; Calambokidis et al. 2009b; Cascadia Research Collective 2011; Carretta et al. 2013). Blue whales are found in coastal and deep offshore waters, but also occur on the continental shelf. Blue whales appear to feed almost exclusively on krill (which are relatively large euphausiid crustaceans) worldwide in areas of cold current upwelling (Nowak 2003; Sears 2002). Some other prey species, including fish and copepods, have been reported as being consumed by blue whales, but these prey are unlikely to contribute substantially to the diet of blue whales (NMFS 2015c). The best estimate of the eastern North Pacific blue whale stock is 2,497 individuals with a minimum population estimate of 2,046 and a PBR of 3.1 whales per year (Carretta et al. 2013). There is some indication that blue whales increased in abundance in California coastal waters between 1979/1980 and 1991 and between 1991 and 1996. Population estimates in 2000/2001 suggest a decline when compared to previous years. Because of the small sample sizes used in these estimates, the accuracy of this apparent decline is uncertain. Blue whales would not be expected to occur in the project area.

Sei Whale

The sei whale is listed as endangered throughout its range under the ESA (35 Fed. Reg. 8491, June 2, 1970). Sei whales are rare off California, Oregon, and Washington (Carretta et al. 2013). Two sei whales were tagged off California in 1962 and 1965, and later commercially taken off the Washington coast in 1969 and British Columbia in 1966 (Rice 1974). No sei whales were observed during aerial surveys Brueggeman et al. (1992) conducted off the coast of Oregon or Washington in 1991 or in 1992, during surveys Green et al. (1993) conducted, or during ship surveys Jeffries et al. (2012) conducted in 2011 and 2012, Oleson et al. (2009) conducted from 2004 to 2008, or Calambokidis et al. (2004b) conducted from 1995 to 2002. Sei whales are primarily found offshore in deeper water and are not associated with coastal waters. Sei whales primarily prey on copepods and amphipods, but also take euphausiids and small fish (Nowak 2003). The most recent abundance estimate for sei whales off California, Oregon, and Washington out to 300 nautical miles (556 km) from the coast is 126 whales based on shipboard surveys in 2005 and 2008 (Forney 2007; Barlow 2010; Carretta et al. 2013). The minimum population estimate is 83 whales with a PBR of 0.17 whales per year (Carretta et al. 2013). Consequently, sei whales would not be expected in the project area.

Right Whale

The North Pacific right whale is listed as an endangered species under the ESA (35 Fed. Reg. 8491, June 2, 1970). It is the least abundant of all whale species. Right whales are found in three general regions: the North Atlantic, the North Pacific, and the Southern Hemisphere. The North Pacific stock has two populations: a Sea of Okhotsk stock and an eastern North Pacific stock. The range of the latter population is thought to include the west coast from Mexico to Alaska (Brownell et al. 2001; Clapham et al. 2004), although few have been observed off the Washington coast. A group of eight right whales was reported off Destruction Island, Washington in April 1959 (Fiscus and Niggol 1965). The most recent sighting of a single whale occurred on May 24, 1992 off Cape Elizabeth (Rowlett et al. 1994). Recent extensive ship surveys in western Alaska indicated no sightings of right whales (Zerbini et al. 2006), nor were any seen off Washington during ship surveys from 1995 to 2012 (Calambokidis et al. 2004b; Oleson et al. 2009; Jeffries et al. 2012). Right whales generally feed on zooplankton, including copepods, near the coast and continental shelf edge. Reliable estimates of population size and trends are not known (Angliss and Outlaw 2005), but observers believe that the North Pacific stock numbers 100 to 200 animals, a small fraction of the pre-whaling abundance (Nowak 2003). More recently, Wade et al. (2011) produced a best estimate of 31 right whales in the Bering Sea. The minimum estimate of abundance is 25.7 with a PBR of 0.05 (Allen and Angliss 2013) based on the photo-identification estimate of 31 whales (Wade et al. 2011). This information suggests that a small number of right whales could occur off the Washington coast; however, the probability is extremely low (Carretta et al. 2006).

3.5.3.1.2 Common Species off the Washington Coast

Steller sea lions, harbor seals, California sea lions, northern fur seals, northern elephant seals, Dall's porpoises, harbor porpoises, Pacific white-sided dolphins, Risso's dolphins, northern right whale dolphins, and minke whales are common in the project area. A short description of each of these species is provided below. These species could occur in the project area during the proposed whale hunt.

Steller Sea Lion

The eastern stock (identified as a distinct population segment) of Steller sea lions extends from California to 144°W longitude (at Cape Suckling, Alaska) at the northern end of southeast Alaska and includes Washington and Oregon. Based on extrapolations from pup counts, the stock is estimated to be within the range of 58,334 and 72,223 animals with a minimum population estimate of 52,847 and a PBR of 2,378 (Allen and Angliss 2013). This stock was listed as threatened under the ESA in 1990 (55 Fed. Reg. 12645, April 5, 1990) but was delisted in 2013 (78 Fed. Reg. 66139, November 4, 2013). Overall, the stock has been increasing at about 3.1 percent per year since the 1970s with the population more than doubling in size by 2002, principally in southeast Alaska (Pitcher et al. 2007). The best available information indicates the eastern stock has increased from an estimated 18,040 animals in 1979 to an estimated 70,174 animals in 2010 (NMFS 2013c).

The Steller sea lion occurs year-round in Washington State (NMFS 1992b). There are no officially recognized rookeries in Washington State, but pupping in Washington has been increasing; an early July aerial survey counted 33 pups in 2011 (J. Scordino, Makah Tribe Marine Mammal Biologist, pers. comm., February 7, 2014). The closest officially recognized rookeries are in northern British Columbia and central Oregon, where pupping occurs from late May to early July. Within Washington, Steller sea lions occur primarily in the nearshore zone and continental shelf zone, with smaller numbers in the inside waters of the Strait of Juan de Fuca and Puget Sound.

There are several Steller sea lion haulout sites in the project area that are used in all months of the year (Gearin and Scordino 1995); peak counts of Steller sea lions in the project area are in spring and fall. Haulout sites within the project area include Tatoosh Island (48° 23.32' N, 124° 44.26' W), Guano Rock (48° 10.90' N, 124 44.52' W), East Bodelteh Island (48° 10.57' N, 124 45.15' W), and West Bodelteh Island (48° 10.75' N, 124 46.27' W) (Jefferies et al. 2000). Steller sea lion counts are variable within and between years. During 2011 and 2012, the average count in the project area peaked in November at 842 sea lions and was the least in September at 79 sea lions (J. Scordino, Makah Tribe Marine Mammal Biologist, pers. comm., February 7, 2014). Just south of the project area, large numbers also haul out on Carroll Island and Sea Lion Rock.

Steller sea lions are opportunistic predators, feeding primarily on a wide variety of fish and cephalopods. Some of the more important prey species in Washington include Pacific whiting, Pacific herring, spiny dogfish, skates, salmon, and smelts (Gearin et al. 1999). Before 2005, Makah tribal regulations explicitly advised subsistence hunters to take care in hunting California sea lions to avoid Steller sea lions (Sepez 2001); since 2005, the Tribe has not authorized direct subsistence harvest of any marine mammals in consideration of the decision in *Anderson v. Evans*.

Harbor Seal

For management purposes, three harbor seal stocks are recognized along the west coast of the continental United States, including the California stock, outer coast of Oregon and Washington stock, and Washington inland waters stock (Carretta et al. 2013). Harbor seals from the last two stocks occur within the project area. Both occur principally in the nearshore zone and are the most common marine mammal in Washington (NMFS 1992b). In 1999, mean counts from aerial surveys showed 10,430 seals off the Washington coast and 5,735 in Oregon, totaling 16,165 harbor seals for the outer coast of Oregon and Washington stock, or a population estimate of 24,732 after using a correction factor to account for seals in the water that are missed during aerial surveys (Jeffries et al. 2003). The mean number of seals in the Washington inland waters stock was estimated to be 14,612 in 1999 (Jeffries et al. 2003); more recent estimates are not available (Carretta et al. 2013). Because the most recent abundance estimates for both of these stocks are greater than 8 years old, there are no current estimates of abundance, minimum population estimates, or PBRs available for these stocks.

The species occurs year-round in Washington. Harbor seals give birth on shore and nurse their pups for 4 to 5 weeks. After the pups are weaned, they disperse widely in search of food. Pupping along the outer coast of Washington and the Strait of Juan de Fuca occurs in May through July, and additionally in August in the strait. Breeding occurs in the water shortly after the pups are weaned. The Makah U&A contains 32 harbor seal haulout sites (Gearin and Scordino 1995; Jefferies et al. 2000). This area (the Makah U&A) is subdivided for convenience into three areas (western Strait of Juan de Fuca complex, Cape Flattery Complex, and the Cape Alava Complex) with variable harbor seal densities within each complex. The western Strait of Juan de Fuca complex has the lowest density (number of seals per nautical mile); the Cape Alava area has the highest density and number of pups (Gearin and Scordino 1995; Jefferies et al. 2000). Common prey include sole, flounder, sculpin, hake, cod, herring, squid, octopus, and, to a lesser degree, salmon (Jeffries and Newby 1986; Orr et al. 2004). Before 2005, the Makah Tribal Council promulgated regulations allowing tribal members to exercise treaty rights for subsistence harvest of harbor seals. An estimated 5 to 15 seals may have been taken for subsistence per year by Northwest tribes (Carretta et al. 2006), but no data on recent takes are available.

California Sea Lion

The California sea lion includes three subspecies of which *Zalophus californianus californianus* (found from southern Mexico to southwestern Canada) occurs in the project area. California sea lions breed on islands in three geographic regions that are used to separate this subspecies into five stocks: the United States stock, which begins at the United States/Mexico border and extends northward into Canada; the Western Baja California stock, which extends from the United States/Mexico border to the southern tip of the Baja California Peninsula; and the Gulf of California stocks (Southern Gulf of California, Central Gulf of California, and Northern Gulf of California) that include the Gulf of California from the southern tip of the Baja California peninsula (Carretta et al. 2013). Based on extrapolations from pup counts, the population is estimated to be 296,750 sea lions, and it is growing at 5.4 percent per year (Carretta et al. 2013). The minimum population estimate is 153,337 sea lions with a PBR of 9,200 per year (Carretta et al. 2013). Males migrate northward along the coast following the summer breeding season in California (the species' only known breeding area). Beginning in August, male California sea lions appear along the outer Washington coast principally in the nearshore and continental shelf zones. Some move into Puget Sound and British Columbia. California sea lions remain in Washington waters through the winter and early spring before returning to California in May and June (Gearin and Scordino 1995; Jeffries et al. 2000). The migration can be characterized as a feeding migration consisting primarily of adult and sub-adult males. California sea lion females and younger animals less than 4 to 5 years old tend to remain near the home rookeries throughout the year, or move only as far north as central California. California sea lions are common in the project area during fall, winter, and spring. In the project area, California sea lions haul out within the Neah Bay Harbor, at Waadah Island (48° 23.19’ N, 124° 36.02’ W), Tatoosh Island, East Bodelteh, and West Bodelteh, as well as on mooring buoys (Jefferies et al. 2000). As many as 4,000 to 5,000 California sea lions have been observed on the Bodelteh Islands during the fall. Farther south on Carroll Island, 200 to 300 sea lions may haul out during the migration peak. Little is known of their diet on the Washington coast, but preliminary data collected by the Makah Tribe at Washington haulouts show that they feed primarily on Pacific whiting, Pacific herring, American shad, salmonids, dogfish sharks, Pacific sardine, northern anchovy, and rockfish (J. Scordino, Makah Tribe Marine Mammal Biologist, pers. comm., March 21, 2013). Before 2005, the Makah Tribe promulgated regulations allowing Tribe members to exercise treaty rights for subsistence harvest of sea lions. Up to two sea lions were taken for subsistence each year (Carretta et al. 2006).

Northern Elephant Seal

Northern elephant seals, estimated to number 124,000 animals, breed off Mexico and California during winter and move northward in the spring to feed from Baja California to northern Vancouver Island and far offshore of the Gulf of Alaska and Aleutian Islands (Nowak 2003; Carretta et al. 2013). The minimum population estimate is 74,913 seals with a PBR of 4,382 per year (Carretta et al. 2013). Populations of northern elephant seals in the United States and Mexico all originally derived from a few tens or a few hundreds of individuals surviving in Mexico after they were nearly hunted to extinction. The California breeding population is now demographically isolated from the Baja California population and is considered a separate stock for management purposes (Carretta et al. 2013). The majority of elephant seal sightings occurred from January to June during visual surveys off the coast of Washington from 2004 to 2008 (Oleson et al. 2009). In contrast, Brueggeman et al. (1992) found that elephant seals occurred off the Washington coast primarily during summer and early fall. They were the second most common pinniped sighted during summer ship surveys off the Washington coast from 1995 to 2002 (Calambokidis et al. 2004b). In contrast, all the elephant seals Brueggeman et al. (1992) observed from mid-fall through spring were off the Oregon coast. Most of the elephant seals they encountered were over the continental shelf and slope, at a mean distance of almost 40 miles (64.4 km) from the coast. Small numbers of elephant seals haul out on East Bodelteh Island during the molting season and rarely at Tatoosh Island (J. Scordino, Makah Tribe Marine Mammal Biologist, pers. comm., March 21, 2013). Elephant seals prey on deepwater and bottom dwelling organisms, including fish, squid, crab, and octopus (Nowak 2003).

Northern Fur Seal

The eastern Pacific stock of the northern fur seal is estimated to number 611,617 animals; the minimum population estimate is 517,679 with a PBR of 11,130 (Allen and Angliss 2013). Based on significant declines in abundance during the 1960s and 1970s, the Pribilof Islands population was listed as depleted under the MMPA in 1984 because population levels had declined to levels lower than 50 percent of those observed in the 1950s (1.8 million animals) (53 Fed. Reg. 17888, May 18, 1988) (Allen and Angliss 2013). Causes of decline and current threats are uncertain but may include climate change, vessel and human presence, depletion of prey species, predation, and environmental contamination (NMFS 2007).

Fur seals are a seasonal migrant off the Washington coast, and they do not breed or haul out (although individuals may infrequently be seen on land intermixed with sea lions) in Washington (Angliss and Outlaw 2005). The closest rookeries are in the Bering Sea (Pribilof Islands and Bogoslof Island) and the Channel Islands (San Miguel Island) off the California coast. During the July to August breeding season, most of the population is found on the Pribilof Islands. Females and juveniles of both sexes migrate south in fall into waters over the continental shelf and slope of the eastern North Pacific Ocean, while adult males generally stay in Alaska waters (Gentry 2002). The migration ranges as far south as 30 to 32°N latitude off southern California and northern Baja, Mexico. Fur seals begin the return migration northward in mid-spring; by early summer, most have returned to their breeding islands (Gentry 2002; Nowak 2003).

In Washington, Oleson et al. (2009) and Brueggeman et al. (1992) reported that northern fur seals primarily inhabited the deep offshore waters, but they also used the continental shelf and slope waters. They were observed off the Washington coast year-round, but most individuals (more than 90 percent) were encountered from January through May. Sightings of northern fur seals in the Strait of Juan de Fuca or Puget Sound are rare, but they do occur occasionally (Gearin and Scordino 1995). They feed on walleye pollock, Pacific herring, capelin, squid, and small schooling fishes (Kajimura 1984). Pribilof Islands Aleut Natives take approximately 600 to 800 sub-adult male fur seals per year for subsistence use (Angliss and Outlaw 2005). Makah Tribe hunters took fur seals from canoes in the open ocean in the late 1800s and into the 1900s, but they do not currently hunt them nor have they recently been taken incidental to the Makah set net fisheries (Swan 1883; Swan 1887; Sepez 2001).

Northern Sea Otter

Sea otters occurred historically along the outer coast of Washington; the population was severely over-hunted in the late mid-1700s to 1800s and extirpated in the Pacific Northwest by 1920 (NMFS 1992b; Jameson 1995). The last known native sea otters in Washington were taken in

Willapa Bay in 1910 (Scheffer 1940). In 1969 and 1970, 59 northern sea otters were transplanted to Washington from Amchitka Island, Alaska (Lance et al. 2004). Although the otters off Washington State are descended from the Amchitka Island sea otters and are, thus, related to the southwest Alaska distinct population segment listed as threatened under the ESA (70 Fed. Reg. 46366, August 9, 2005), they are geographically isolated from the southwest Alaska population by hundreds of miles and are not included in the listing. Sea otters off the Washington coast have been listed as a Washington State endangered species since 1981 because of their small population size, restricted distribution, and vulnerability (Lance et al. 2004).

The USFWS has conducted cooperative sea otter surveys with WDFW since 1985. Between 1989 and 2011, the sea otter population has increased at a 7.9 percent annual rate with a population of 1,154 sea otters in 2011 (Jameson and Jeffries 2013). The PBR for this stock is 11 animals (Carretta et al. 2013). Laidre et al. (2002) estimated the carrying capacity of sea otters at 1,836 individuals (95 percent confidence interval from 1,386 to 2,286), based on an assumption that sea otters will reoccupy most of their historic habitat along the outer Washington coast (excluding reoccupation of the Columbia River, Willapa Bay, and Grays Harbor estuaries because of significant human alterations and use) and eastward into the Strait of Juan de Fuca as far as Protection Island. The USFWS and WDFW use these estimates in stock assessment reports and recovery plans; the most recent count of sea otters in Washington suggest they are at 60 percent of their estimated carrying capacity and thus at OSP (Carretta et al. 2013).

The current sea otter population range extends around the Olympic Peninsula from as far south as Cape Elizabeth on the outer Olympic Peninsula coast to as far east as Pillar Point in the Strait of Juan de Fuca, with concentrations near Duk Point, Cape Alava, Sand Point, Cape Johnson, Perkins Reef, and Destruction Island (Figure 3-2). However, scattered individuals have been seen outside of this range (Carretta et al. 2013). More than half of the population occurs outside of the Makah U&A south of La Push, with the single largest concentration of otters located at Destruction Island (Jameson and Jeffries 2005; Jameson and Jeffries 2013). A large group of males moved into the Strait of Juan de Fuca during winter in the 1990s (Lance et al. 2004), but have not done so since 2000. In 2011, only two sea otters were observed in the Strait of Juan de Fuca during the annual surveys, both east of Waadah Island near Neah Bay (Jameson and Jeffries 2013). Sea otters generally inhabit shallow coastal waters less than 1 mile from shore, but sea otters are found out to at least 5 miles from the Cape Alava area. In Washington, sea otters generally stay in relatively shallow waters and forage on a variety of marine invertebrates, including sea urchins, throughout their entire depth range from intertidal areas out to at least 20 fathoms (120 feet/36.6 m) (Lance et al. 2004). Sea otters pup in late winter and early spring, and the pups are weaned in late summer and early fall. Reproduction occurs throughout the area (Lance et al. 2004). Post-weaning mortality is higher for males than females and increases as resources become limited (Estes and Bodkin 2002). Low levels of mortality occur in adult females as a result of injury by males during copulation (Estes and Bodkin 2002). Sea otters are preyed upon by white sharks, killer whales, and, infrequently, Steller sea lions. Of the marine mammals within the project area, they (and northern fur seals) are most susceptible to mortality caused by oil spills because of damage to their fur, which is important in regulating metabolism (Ballachey et al. 1994). The expanding sea otter population has had a substantial impact on the Makah Tribe's sea urchin fishery. The annual sea otter mortality in the gillnet fishery is assumed to be a minimum of two when there is fishing effort (Carretta et al. 2013).

Harbor Porpoise

Two harbor porpoise stocks are recognized within the project area, the Washington Inland Waters stock and the Northern Oregon/Washington Coast stock. Some movement between the two stocks is likely, but is currently not possible to quantify (Carretta et al. 2013). The most recent estimate of abundance for the Washington Inland Waters stock is from 2002/2003 and is 10,682 (Carretta et al. 2013). The Northern Oregon/Washington Coast stock was estimated to number 15,674 animals in 2002. Because the most recent abundance estimates for both stocks are greater than 8 years old, there are no current estimates of abundance, minimum population estimates, or PBRs for these stocks (Carretta et al. 2013). The Northern Oregon/Washington Coast stock is present year-round off the Washington coast, and those in the Inland Waters stock are present throughout most of the year in inland waters (Carretta et al. 2013). Numbers of harbor porpoises are particularly high in the fall and winter, low in the summer, and intermediate in the spring (Brueggeman et al. 1992). Oleson et al. (2009) reported 114 sightings of 244 animals during boat surveys off the coast of Washington between 2004 and 2008. The fall sightings were closest to shore, farthest from the shelf edge, and in shallower waters. However, in the summer, sightings were farthest from shore, closest to the shelf edge, but in deeper water. They are widespread throughout the inland and coastal waters of Washington with the exception of southern Puget Sound (NMFS 1992b). Scheffer and Slipp (1948) provide a historical account of this species in Washington.

Harbor porpoises are known to calve and breed in Washington, and they generally give birth in summer from May through July. Calves remain dependent for at least 6 months (Leatherwood et al. 1982). Harbor porpoises are usually shy and avoid vessels; thus, they are difficult to approach. The species frequents inshore areas, shallow bays, estuaries, and harbors. Harbor porpoises are found almost exclusively shoreward of the 100-fathom (600-foot/183-m) contour line along the Pacific coast, with the vast majority found inside the 25-fathom (150-foot/46-m) curve (Gearin and Scordino 1995; Green et al. 1992). The primary prey of harbor porpoise are small fish and squid typically found in shallow waters. Bottom-dwelling fishes and small pelagic schooling fishes with high lipid content, including herring and anchovy, are common prey (Bjorge and Tolley 2002; Leatherwood and Reeves 1986). Small numbers of harbor porpoise have recently been taken incidentally in Makah set net fisheries, including two individuals in 2004 but none from 2005 through 2009 (Carretta et al. 2013).

Dall's Porpoise

Dall's porpoises are common off the Washington coast, but their distribution and abundance are variable and likely linked to variable oceanographic conditions (Carretta et al. 2013). They are probably the most widely distributed cetacean in the temperate and subarctic regions of the North Pacific and Bering Sea (Leatherwood et al. 1982). An estimated 42,000 Dall's porpoises occur in the California, Oregon, and Washington stock with a minimum population estimate of 32,106 and a PBR of 257 animals per year (Carretta et al. 2013). Jeffries et al. (2012) reported 69 sightings of 244 individuals during boat surveys off the Washington and Oregon coasts between 2011 and 2012. During ship surveys off the Washington coast between 2004 and 2008, Oleson et al. (2009) reported 44 sightings of 206 animals. They were the most common small cetacean observed in ship surveys off the Washington coast from 1995 to 2002 with 115 sightings of 406 animals (Calambokidis et al. 2004b). Brueggeman et al. (1992) reported 152 groups containing 341 Dall's porpoise, including four calves, during surveys off the coast of Oregon and Washington. Porpoises were most common during fall, least common during winter, and intermediate in occurrence during spring and summer, although encounter rates were not substantially different among seasons, suggesting that a resident population occurs off the coast of Oregon and Washington (Brueggeman et al. 1992). Encounter rates were highest over the continental slope, lowest on the continental shelf, and intermediate in offshore waters. They rarely occurred in shallow coastal waters. Dall's porpoises were observed in small groups, which are consistent with observations reported in other studies, although aggregations of at least 200 individuals have been reported. They occur only rarely in groups of mixed species, although they are sometimes seen in the company of harbor porpoises and gray whales (Klinowska 1991; Reeves and Leatherwood 1994; Oleson et al. 2009). Dall's porpoises apparently feed at night. They depend, to some degree, on the deep scattering ocean layer through which fauna travel upwards each night from the deeper parts of the ocean's water column. Prey species, as determined from stomach contents, include squid and schooling fishes (Jefferson 2002; Klinowska 1991; Reeves and Leatherwood

1994). Killer whales and sharks are believed to be the primary natural predators of Dall's porpoises.

Pacific White-Sided Dolphin

The Pacific white-sided dolphin numbers an estimated 26,930 animals in the California, Oregon, and Washington stock, and it is one of the most abundant dolphins occurring year round off the coast of Washington (Brueggeman et al. 1992; Green et al. 1993; Carretta et al. 2013). The estimated minimum population level is 21,406 with a PBR at 193 dolphins per year (Carretta et al. 2013). Jeffries et al. (2012) reported four sightings of 159 animals in 2011 and six sightings of 171 animals in 2012 off the coasts of Washington and Oregon. Between 2004 and 2008, white-sided dolphins were acoustically detected 9 to 10 months each year in the coastal waters of Washington; nighttime detection rates were eight times higher than daytime detection rates (Oleson et al. 2009). Oleson et al. (2009) also recorded 18 sightings of 1,681 animals during visual surveys along the outer Washington coast. Calambokidis et al. (2004b) recorded 28 sightings of 1,133 individuals in offshore waters during ship surveys off the Washington coast from 1995 to 2002. Some seasonal shifts occur off the coast of Oregon and Washington where dolphins are more common in offshore waters during spring. Their distribution shifts to continental slope waters during summer and fall, in rough synchrony with the movements of prey (VanWaerebeek 2002). Pacific white-sided dolphins may also move north to south seasonally (Forney and Barlow 1998). Although peak abundances off the Oregon and Washington coast have been reported during May from visual surveys (Brueggeman et al. 1992; Buckland et al. 1993), acoustic detections peaked in the summer and high levels of detection continued through November (Oleson et al. 2009). Pacific white-sided dolphins consume a wide variety of fishes and cephalopods. Off the coast of British Columbia, herring was the most commonly occurring prey species, followed by salmon, cod, shrimp, and capelin (Heise 1997). Pacific white-sided dolphins have been known to occur in association with other marine mammals, including Dall's porpoise, Risso's dolphin, northern right whale dolphin, humpback whale, and gray whale (Brueggeman et al. 1992).

Risso's Dolphin

Risso's dolphins are distributed world-wide in warm-temperate and tropical waters along the continental shelf and slope edge. They are estimated to number 6,272 animals in the California, Oregon, and Washington area with a minimum population level of 4,913 and a PBR of 39 per year (Carretta et al. 2013). Risso's dolphins are common off the coast of Washington, where they are present year-round (Brueggeman et al. 1992). Jeffries et al. (2012) reported two sightings of six animals in the coastal waters off Washington in the summer of 2011. During surveys along the outer coast of Washington between 2004 and 2008, Risso's dolphins were acoustically detected an average of 5 to 6 days per year, but were only visually observed on two occasions of 38 animals (Oleson et al. 2009). Nine sightings of 79 individuals were reported off the Washington coast during ship surveys from 1995 to 2002 (Calambokidis et al. 2004b). They are most common during spring and summer, least common in winter, and intermediate in occurrence during the fall (Brueggeman et al. 1992). Calves have been observed off the coast of Oregon and Washington during May, July, and November. Risso's dolphins primarily inhabit continental slope waters, but they also occur in lower numbers near the edge of the continental shelf. Risso's dolphins are consistently found on the continental slope and in shelf-edge waters throughout the year, suggesting there is no inshore to offshore movement pattern. However, there may be some seasonal north to south movement of Risso's dolphins between Oregon/Washington and California, based on the shifts in abundance between the two regions, possibly related to prey movements. Principal prey include cephalopods and fish, and limited behavioral research suggests that they feed primarily at night (Baird 2002; Nowak 2003). Risso's dolphins have been known to occur in association with other marine mammals, including Pacific white-sided and northern right whale dolphins (Brueggeman et al. 1992). No habitat issues are known to be of concern for this species, and human-caused mortality from commercial fishing and other sources is low (Carretta et al. 2013).

Northern Right-Whale Dolphin

The California, Oregon, and Washington stock of the northern right whale dolphin is estimated at 8,334 animals with a minimum population estimate of 6,019 and a PBR of 48 dolphins per year (Carretta et al. 2013). The species is relatively common off the coast of Washington, which is toward the northern end of its range in the eastern North Pacific Ocean (Brueggeman et al. 1992). Oleson et al. (2009) reported three sightings of 59 animals during ship surveys off the Washington coast from 2004 to 2008. The northern right whale dolphin has been reported in Washington waters during all seasons except winter (Calambokidis et al. 2004b; Brueggeman et al. 1992). Numbers are highest in the fall and lowest during spring and summer. While northern right whale dolphins show a seasonal abundance pattern off the Washington coast that is somewhat opposite of the California pattern, it is not clear whether they move between the two areas. They are gregarious animals, often traveling in groups of 2,000 to 3,000 animals. The primary prey for this species include lanternfish, Pacific whiting, saury, mesopelagic fish, and squid (Lipsky 2002). The northern right whale dolphin has been frequently reported in association with Pacific white-sided dolphins (Leatherwood and Walker 1979; Brueggeman et al. 1992).

Minke Whale

There is no population estimate for minke whales in the North Pacific Ocean. The number off the coast of California, Oregon, and Washington is, however, estimated to be 478 whales based on vessel surveys in 2005 (Forney 2007) and 2008 (Barlow 2010), with a minimum population size of 202 whales and a PBR of 2.0 whales per year (Carretta et al. 2013). They typically occur as single animals, rather than in groups. Jeffries et al. (2012) reported two sightings of two individuals during ship surveys off Washington and Oregon coasts in the summer of 2011. From July 2004 to September 2008, Oleson et al. (2009) conducted visual and acoustic monitoring efforts in waters off the outer coast of Washington and reported only one sighting of one minke whale during the visual surveys. Calambokidis et al. (2004b) reported four sighting of four individuals during ship surveys off the Washington coast from 1995 to 2002. Brueggeman et al. (1992) encountered four single minke whales, including three off the Oregon coast and one off the Washington coast. Most were on the continental shelf. Minke whales are also known to enter shallow bays and estuaries (Nowak 2003). Green et al. (1993) reported 10 groups of 12 minke whales off the Oregon and Washington coasts between March and May, but did not give their locations or indicate the distributions between the two states. Minke whales in the North Pacific Ocean typically prey on euphausiids, Japanese anchovy, Pacific saury, walleye pollock, small fish, and squid (Perrin and Brownell 2002; Nowak 2003).

3.5.3.1.3 Uncommon Marine Mammal Species off the Washington Coast

Nine uncommon marine mammals are occasionally sighted off the Washington coast. They include Guadalupe fur seals, common dolphin, striped dolphin, false killer whale, pilot whale, pygmy sperm whale, Baird’s beaked whale, Curvier beaked whale, Hubb’s beaked whale, and Stejneger’s beaked whale (Table 3-16). Most of these species would be expected to occur seasonally in low numbers in deeper offshore waters. Oleson et al. (2009) reported one sighting of three Curvier beaked whales in June 2006. Brueggeman et al. (1992) observed a small number of false killer whales in the spring and beaked whales in the fall off the Washington coast. Five groups of 21 Baird’s beaked whales were also observed, but all were off the Oregon coast during spring and summer, suggesting low occurrence by this species in Washington waters. While there is some limited information on this group of uncommon marine mammals, little is known about their use of waters off the Washington coast. Summary information for each species can be found in Carretta et al. (2014), Allen and Angliss (2013), and Perrin et al. (2002).

3.5.3.2 Other Marine Wildlife

In addition to several species that are listed as threatened or endangered under the ESA, the project area provides breeding and wintering habitat for numerous species of seabirds. The following sections provide descriptions of ESA-listed species and other seabird species. The latter discussion is organized by the habitat types with which the species are associated.

3.5.3.2.1 ESA-listed Species and Designated Critical Habitat

The following ESA-listed marine wildlife species are either known to occur or could occur in the project area: marbled murrelet, short-tailed albatross, leatherback sea turtles, green sea turtles, loggerhead sea turtles, and olive ridley sea turtles. The brown pelican and bald eagle also occur in the area but have been delisted. The subsections below provide brief descriptions of species that are currently ESA-listed and that may occur in the project area.

Marbled Murrelet

The marbled murrelet is federally listed as threatened under the ESA (57 Fed. Reg. 45328, October 1, 1992). This species nests in mature and old-growth forests and forages in marine waters. Nearshore marine waters within 1.2 miles (1.9 km) are considered essential to the recovery of the species (USFWS 1997). Newer information indicates murrelets occur out to 5 miles (8 km) from shore with the highest mean densities closer to shore (Raphael et al. 2007). Critical marine foraging habitat includes "proximity of old-growth forests, distribution of rocky shoreline/substrate versus sand shoreline/substrate, and abundance of kelp" (Thompson 1996, as cited in USFWS 1997). Key prey species include Pacific sand lance, Pacific herring, northern anchovy, smelt, and possibly sardines, although the birds will forage on a variety of other small fish and macrozooplankton.

In the project area, marbled murrelets occur throughout the year in the nearshore marine waters and bays. During their pre-basic molt (occurring between July and December), marbled murrelets are flightless for 2 months and must select areas which provide adequate prey resources within swimming distance (Carter and Stein 1995). As indicated in a study by Thompson (1999), marbled murrelets are more abundant closer to shore. In Thompson's study (1996, as cited in USFWS 1997), murrelet density declined with increasing distance from the coastline. Survey data collected under the auspices of the Northwest Forest Plan effectiveness monitoring indicate that murrelet densities in the project area begin to decline 1.9 miles (3 km) from shore (D. Lynch, USFWS Wildlife Biologist, pers. comm., 2006) and Huff et al. (2006) reported that only a small proportion of the population (generally less than 5 percent) is found beyond 1.86 miles (3 km) from shore. From 2001 to 2010, the density of marbled murrelets has decreased from 2.52 birds/sq. km to 1.90 birds/sq. km. Further, marbled murrelet populations have decreased by annual rates of 7.4 percent (Zone 1–Strait of Juan de Fuca [east of Koitlah Point] and Puget Sound) and 6.5 percent (Zone 2–Strait of Juan de Fuca [west of Koitlah Point] and the

Washington coast) (Miller et al. 2012). In 2010 monitoring, the highest densities found in Washington State occurred from Cape Flattery to the mouth of the Quinault River (WDFW 2012a).

Short-tailed Albatross

The short-tailed albatross, which is federally listed as endangered under the ESA, is an extremely rare bird off Washington's coastline (65 Fed. Reg. 46643, July 31, 2001). According to the Seattle Audubon Society's BirdWeb, there were only a few valid records of the short-tailed albatross on the west coast south of Alaska between 1940 and 1990, with most seen between April and August (Seattle Audubon Society 2005). Since the early 1990s, sightings have increased with six sightings of short-tailed albatross reported off the Washington coast over the past 3 years (eBird 2015). Sightings of these pelagic birds are generally more than 20 miles (32 km) from the coastline. Short-tailed albatross feed primarily on squid (Seattle Audubon Society 2005).

Sea Turtles

Four species of sea turtles occur off Washington's outer coast: the leatherback turtle, green turtle, loggerhead turtle, and olive ridley turtle. Leatherback sea turtles are federally listed as endangered under the ESA, while the three other sea turtles are federally listed as threatened in the Washington area (35 Fed. Reg. 8491, June 2, 1970; 43 Fed. Reg. 32800, July 28, 1978). Leatherback sea turtles are associated with pelagic habitats and while rare, occur with some regularity in the deep waters off the coast of Washington (Bowlby et al. 1994). In addition, these turtles occasionally have been sighted in bays and estuaries, although bays and estuaries are not their preferred habitat (Brown et al. 1995). Leatherback sea turtles' diet consists almost exclusively of jellyfish (Sea Turtle, Inc. 2005). The species does not nest in Washington State. The entire project area is designated as critical habitat for leatherback turtles (77 Fed. Reg. 4170, January 26, 2012).

The other three sea turtle species (green, loggerhead, and olive ridley) are strictly warmer water species, and they occur infrequently off the coast of Washington during the summer (Brown et al. 1995). Higher occurrences of the sea turtles coincide with El Niño years that are characterized by warmer currents in the area. Diets of the three species vary. The green sea turtle is mostly herbivorous and feeds on a variety of sea grasses and marine algae; the loggerhead is primarily carnivorous and feeds on a variety of crabs, jellyfish, shellfish, and sponges; and the olive ridley is omnivorous and feeds primarily on crustaceans, mollusks, and tunicates (Sea Turtle, Inc. 2005). None of these sea turtles nest in Washington State.

3.5.3.2.2 Non-listed Birds and Their Associated Habitats

The project area provides important habitat for bald eagles and some of the largest seabird colonies in the continental United States. The area also provides wintering and other non-breeding habitat for marine birds. Considering all seasonal uses, more than 100 marine bird species use the marine waters, associated beaches, and offshore islands within the project area, with 20 of these species known to nest in the project area (Table 3-17).

Bald Eagle

The bald eagle was removed from the ESA list of threatened species on July 9, 2007 (72 Fed. Reg. 37346). These birds are present in Washington State year-round, although individual birds may be present for only a portion of the year (e.g., the wintering period). Bald eagles nest in large, superdominant trees, generally away from intense human activity, and they forage in nearby waters with abundant fish, waterfowl, and seabird prey (Stinson et al. 2001). Perch sites generally consist of large trees along shorelines. Roost sites are typically large trees within forested stands that are located within 0.67 mile (1 km) of foraging areas (Stinson et al. 2001).

Bald eagle nest sites occur throughout the proposed project area's coastline. Most of the Washington State bald eagle wintering population occurs along major salmon rivers (e.g., Skagit, Nooksack, and Columbia Rivers), but the birds also winter along the state's outer coastline and along the Strait of Juan de Fuca, including portions of the project area (Stinson et al. 2001).

Brown Pelican

Brown pelicans also occur in the project area and were de-listed under the ESA in 2009 (74 Fed. Reg. 59444, November 17, 2009). They occur as non-breeding individuals from June to October (Seattle Audubon Society 2005) and forage in marine waters, particularly in shallow areas, including bays and estuaries, and near offshore islands, spits, breakwaters, and open sand beaches. The birds rarely forage more than 40 miles (64 km) from shore (USFWS 2005a). Their diet consists of schooling anchovies, herring, Pacific mackerel, minnow, and sardines (Monterey Bay Aquarium 2003). Brown pelicans roost on offshore islands in the project area (Seattle Audubon Society 2005).

Marine Environments Used by Marine Birds in the Project Area

The marine environments used by marine birds in the project area can be divided into six habitat types: 1) coastal beaches, bays, and estuaries; 2) coastal headlands and islands; 3) nearshore marine waters; 4) inland marine deeper waters; 5) marine shelf; and 6) oceanic waters. Habitat types for marine birds are based on Buchanan et al. (2001), but were modified slightly for consistency with marine fish habitat types (NMFS 2005c) and marine mammal habitats. This subsection describes these habitats and their associated bird species.

Table 3-17. Marine bird species present in the Makah U&A.

Common Name	***Scientific Name***
LOONS AND GREBES	***GAVIIDAE AND PODICIPEDIDAE***
Common loon	*Gavia immer*
Pacific loon	*Gavia pacifica*
Red-throated loon	*Gavia stellata*
Yellow-billed loon	*Gavia adamsii*
Horned grebe	*Podiceps auritus*
Red-necked grebe	*Podiceps grisegena*
Western grebe	*Aechmophorus occidentalis*
Eared grebe	*Podiceps nigricollis*
TUBENOSES	***PROCELLARIIFORMES (DIOMEDEIDAE, PROCELLARIIDAE AND HYDROBATIDAE)***
Black-footed albatross	*Diomedea nigripes*
Short-tailed albatross	*Phoebastria albatrus*
Laysan albatross	*Diomedea immutabilis*
Buller’s shearwater	*Puffinus bulleri*
Flesh-footed shearwater	*Puffinus carneipes*
Pink-footed shearwater	*Puffinus creatopus*
Short-tailed shearwater	*Puffinus tenuirostris*
Sooty shearwater	*Puffinus griseus*
Northern fulmar	*Fulmaris glacialis*
Fork-tailed storm petrel*	*Oceanodroma furcata*
Leach’s storm petrel*	*Oceanodroma leuchorhoa*
PELICANS AND CORMORANTS	***PELECANIDAE AND PHALOCROCORACIDAE***
Brown pelican	*Pelecanus occidentalis*
Brandt’s cormorant*	*Phalacrocorax penicillatus*
Double-crested cormorant*	*Phalacrocorax auritis*
Pelagic cormorant*	*Phalacrocorax pelagicus*
SWANS, GEESE, AND DUCKS	***ANATIDAE***
Trumpeter swan	*Cygnus buccinator*
Tundra swan	*Cygnus columbianus*
Aleutian Canada goose	*Branta canadensis leucopareia*

Common Name	*Scientific Name*
Brant	*Branta bernicla*
Black scoter	*Melanitta nigra*
Surf scoter	*Melanitta perspicillata*
White-winged scoter	*Melanitta fusca*
Harlequin duck	*Histrionicus histrionicus*
Oldsquaw	*Clangula hyemalis*
Bufflehead	*Bucephala albeola*
Common goldeneye	*Bucephala clangula*
Barrow’s goldeneye	*Bucephala islandica*
Greater scaup	*Aythya marila*
Lesser scaup	*Aythya affinis*
Canvasback	*Aythya valisineria*
Red-breasted merganser	*Mergus serrator*
Common merganser	*Mergus merganser*
Hooded merganser	*Lophodytes cucullatus*
Gadwall	*Anas strepera*
Eurasian widgeon	*Anas penelope*
American widgeon	*Anas americana*
Mallard	*Anas platyrhynchos*
Green-winged teal	*Anas crecca*
Blue-winged teal	*Anas discors*
Northern shoveler	*Anas clypeata*
Northern pintail	*Anas acuta*
Ruddy duck	*Oxyura jamaicensis*
RAILS, GALLINULES, AND COOTS	***RALLIDAE***
American coot	*Fulica americana*
EAGLES, OSPREYS, AND FALCONS	***FALCONIFORMES***
Bald eagle*	*Haliaeetus leucocephalus*
Osprey*	*Pandion haliaetus*
Peregrine falcon*	*Falco peregrinus*
OYSTERCATCHERS	***HAEMATOPODIDAE***
Black oystercatcher*	*Haematopus bachmani*
PLOVERS	***CHARADRIIDAE***
Killdeer*	*Charadrius vociferous*

Common Name	*Scientific Name*
Semipalmated plover	*Charadruis semipalmatus*
American golden plover	*Pluvialis dominicus*
Black-bellied plover	*Pluvialis squatarola*
SANDPIPERS, TURNSTONES, SURFBIRDS, AND PHALAROPES	***SCOLAPACIDAE***
Black turnstone	*Arenaria melanocephala*
Ruddy turnstone	*Arenaria interpres*
Surfbird	*Aphriza virgata*
Marbled godwit	*Limosa fedoa*
Greater yellowlegs	*Tringa melanoleuca*
Lesser yellowlegs	*Tringa flavipes*
Spotted sandpiper*	*Actitis macularia*
Whimbrel	*Numenius phaeopus*
Wandering tattler	*Heteroscelus incanus*
Long-billed dowitcher	*Limnodromus scolopaceus*
Short-billed dowitcher	*Limnodromus griseus*
Rock sandpiper	*Calidris ptilocnemis*
Baird’s sandpiper	*Calidris bairdii*
Dunlin	*Calidris alpina*
Least sandpiper	*Calidris minutilla*
Sanderling	*Calidris alba*
Western sandpiper	*Calidris mauri*
Red phalarope	*Phalaropus fulicaria*
Red-necked phalarope	*Phalaropus lobatus*
Northern phalarope	*Lobipes lobatus*
JAEGERS AND SKUAS	***STERCORARIINAE***
Long-tailed jaeger	*Stercorarius longicaudus*
Parasitic jaeger	*Stercorarius parasiticus*
Pomarine jaeger	*Stercorarius pomarinus*
South polar skua	*Catharacta mccormicki*
GULLS AND TERNS	***LARIDAE***
Bonaparte’s gull	*Larus philadelphia*
California gull	*Larus californicus*
Glaucous-winged gull*	*Larus glaucescens*

Common Name	***Scientific Name***
Heerman's gull	*Larus heermanni*
Herring gull	*Larus argentatus*
Mew gull	*Larus brachyrhynchos*
Ring-billed gull	*Larus delawarensis*
Sabine's gull	*Xema sabini*
Thayer's gull	*Larus thayeri*
Western gull*	*Larus occidentalis*
Black-legged kittiwake	*Rissa tridactyla*
Caspian tern	*Sterna caspia*
Common tern	*Sterna hirundo*
Forster's tern	*Sterna forsteri*
Arctic tern	*Sterna paradisaea*
ALCIDS	***ALCIDAE***
Ancient murrelet	*Synthliboramphus antiquum*
Cassin's auklet*	*Ptychoramphus aleutica*
Common murre*	*Uria aalge*
Marbled murrelet	*Brachyramphus marmoratus*
Pigeon guillemot*	*Cepphus columbia*
Rhinoceros auklet*	*Cerorhinca monocerata*
Tufted puffin*	*Lunda cirrhata*
KINGFISHERS AND HERONS	***ALCEDINIDAE AND ARDEIDAE***
Belted kingfisher*	*Ceryle alcyon*
Great blue heron*	*Ardea herodias*
Green heron	*Butorides striatus*
American bittern	*Botaurus lentiginosus*

Sources: Speich and Wahl 1989; Peterson 1990; Buchanan et al. 2001; USFWS 2005b.
* = species known to nest in the area.

Coastal Beaches, Bays, and Estuaries

The project area includes several beaches, bays, and estuaries. Bays and estuaries provide concentrations of nutrients and forage for marine birds and shorebirds such as loons, grebes, mergansers, scoters, dunlins, plovers, and sandpipers. Beaches, particularly those with fine-grained sand, provide forage areas for several shorebird species, including sanderlings, dunlins, and killdeer. Human-made structures, such as jetties, pilings, and buoys, provide important roosting habitat for cormorants, gulls, and other birds. Approximately 49 marine bird species in

Washington State are closely associated with beaches, bays, and estuaries; 37 marine bird species are generally associated; and another 16 marine bird species occasionally use beaches, bays, and estuaries (Table 3-18). Bird densities along the beaches and in the bays and estuaries are particularly high during winter and during spring and fall migration periods (Buchanan et al. 2001).

Table 3-18. Marine bird species richness in marine habitats based on habitat association.

Habitat Type	Habitat Use (recorded as number of species) Closely Associated[1]	Generally Associated[2]	Occasional Use[3]	Total
Beaches, bays, and estuaries	49	37	16	102
Headlands and islands	22	14	2	38
Nearshore marine	31	26	10	67
Inland marine	21	17	9	47
Marine shelf	28	15	9	52
Oceanic	18	7	3	28

Source: Table adapted and modified from Buchanan et al. (2001). Because some species are associated with more than one habitat type, totals within columns are not additive.

[1] Closely associated: A species is widely known to depend on a habitat for part or all of its life-history requirements.

[2] Generally associated: A species exhibits a high degree of adaptability and may be supported by a number of habitats. These habitats play a supportive role for the species' maintenance and viability.

[3] Occasional use: A species demonstrates occasional use of a habitat. The habitat provides marginal support to the species for its maintenance and viability.

Coastal Headlands and Islands

This habitat type includes coastal headlands and bluffs, rocky cliffs, and offshore rocks and islands. In the project area, steep headlands, bluffs, and cliffs are used by ledge-nesting birds, including peregrine falcons, pelagic cormorants, and common murres. Offshore islands and rocks support large breeding colonies of seabirds (Speich and Wahl 1989; Buchanan et al. 2001; USFWS 2005b).

Comprehensive information on seabird colony breeding densities in Washington is available from Speich and Wahl (1989).[69] These researchers summarized seabird colony data from surveys conducted from 1978 to 1982. In the Cape Flattery survey region, which extends along the outer Washington coast from Cape Flattery to Carroll Island and inland along the Strait of Juan de Fuca

[69] The Washington Department of Fish and Wildlife recently developed a geodatabase that: 1) incorporates the spatial and tabular data from the Catalog of Washington Seabird Colonies (Speich and Wahl 1989), and 2) added new information from seven survey efforts conducted since Speich and Wahl (1989). However, data were still being checked for accuracy and summary reports were not available at the time of this draft EIS.

to Sail Rock, surveyors documented 13 breeding seabird species, the most common of which were Cassin's auklets, Leach's storm-petrels, and tufted puffins (Table 3-19). Sites with the highest recorded abundance of seabird colonies (all species combined) in this region include Carroll Island (18,876 breeding seabirds), Bodelteh Island (11,618 breeding seabirds), and the Tatoosh Islands (3,528 breeding seabirds). In addition to the survey sites from the Cape Flattery survey region, the Speich and Wahl report includes data from Jagged Island, near the southern boundary of the Makah U&A. The surveyors recorded 37,057 breeding seabirds on Jagged Island, including 20,000 Leach's storm-petrels, 7,800 tufted puffins, and 8,000 Cassin's auklets (Speich and Wahl 1989).

Table 3-19. Breeding seabird species and abundance in the vicinity of Cape Flattery.

Species	Approximate Number of Breeding Birds
Cassin's auklet	24,000
Leach's storm-petrel	11,000
Tufted puffin	8,700
Glaucous-winged or western gulls	4,400
Fork-tailed storm-petrel	3,700
Common murre	900
Pelagic cormorant	900
Rhinoceros auklet	200
Double-crested cormorant	150
Pigeon guillemot	150
American black oystercatcher	60
Brandt's cormorant	10

Source: Speich and Wahl (1989)

A variety of shorebirds (such as plovers, oystercatchers, sanderlings, and sandpipers) uses offshore rocks and islands and their associated tidal areas for foraging and roosting. The larger islands (including Ozette Island and the Bodelteh Islands) are used by several raptors (such as peregrine falcons) for foraging and occasionally nesting. Passerines (such as swallows and sparrows) use these islands for nesting, foraging, and migration resting areas (USFWS 1985). Nesting great blue herons have also been documented on the larger islands (USFWS 1985). The island vicinities are also used by migrating and wintering marine birds (such as gulls, loons, grebes, and scoters). Buchanan et al. (2001) indicate that 22 marine bird species in Washington are closely associated with headlands and offshore islands (Table 3-18).

Nearshore Marine Zone

The nearshore marine habitat zone includes those marine waters along shorelines that are not significantly affected by freshwater inputs (i.e., excludes bays and estuaries) (Buchanan et al. 2001). Nearshore marine habitat includes both nearshore marine waters and inland marine deeper waters. Nearshore marine waters extend from the high tide line to a depth of approximately 66 feet (20 m) (Buchanan et al. 2001). Typical birds that forage in nearshore marine waters include western grebes, Brandt's cormorants, common murres, sooty shearwaters, and rhinoceros auklets; the latter three species may concentrate in large numbers during the summer (Buchanan et al. 2001). A variety of common marine birds (e.g., phalaropes, other shorebirds, and waterfowl) also uses nearshore marine habitats as migration corridors (Buchanan et al. 2001). Buchanan et al. (2001) indicate that 31 bird species in Washington are closely associated with nearshore marine waters (Table 3-18).

Within the project area, inland marine deeper waters include waters ranging from 66 feet (20 m) deep within the western portion of the Strait of Juan de Fuca up to 120 feet (37 m) deep. Species richness is relatively low in this area, with richness and bird densities higher in winter than summer (Table 3-18) (Buchanan et al. 2001). Common wintering birds in the area include western grebes, common murres, scoters, phalaropes, mergansers, buffleheads, and goldeneyes (Buchanan et al. 2001; Nysewander et al. 2004). Murres are also common in summer, along with cormorants and auklets.

Continental Shelf

Along the outer coast of Washington, the continental shelf habitat includes those marine waters from approximately 120 to 600 feet (37 to 183 m) deep (Buchanan et al. 2001, as modified by NMFS 2005c). As with the nearshore marine habitat, the continental shelf provides foraging habitat and a migration route for a variety of marine birds. In Washington, 28 birds are highly associated with continental shelf habitat (Table 3-18). Typical birds that forage in the shallower portions of the continental shelf are common murres, rhinoceros auklets, tufted puffins, and sooty shearwaters. Typical birds in the outer, deeper portions of the continental shelf include albatrosses, fulmars, storm-petrels, and shearwaters (in addition to the sooty shearwater). Species use varies by season, with the most species during winter and the fewest species during summer (Buchanan et al. 2001). Bird densities are greatest in summer and early fall, when both summer residents and migrant phalaropes, jaegers, terns, and alcids are present (Buchanan et al. 2001).

Continental Slope

Oceanic waters include the marine slope (waters from 600 to 4,200 feet [183 to 1,280 m] deep) and offshore areas (waters greater than 1.25 miles [2 km] deep) (Buchanan et al. 2001, as modified by NMFS 2005c). Species richness and bird densities in oceanic waters are diminished compared to the other marine habitats, presumably because of the lower abundance of food in oceanic waters (Table 3-18) (Buchanan et al. 2001). As with the continental shelf, bird densities in oceanic waters are greatest in late summer to early fall, when both summer residents and fall migrants are present. Characteristic bird species of the continental shelf include the black-footed albatross, fork-tailed storm-petrel, northern fulmar, herring gull, and black-legged kittiwake (Buchanan et al. 2001).

3.5.3.3 Sensitivity of Wildlife to Noise and Other Disturbance

This section describes the sensitivity of marine wildlife species to noise and other disturbance. Anthropogenic noise can be either transient or continuous and can result in a variety of effects with consequences ranging from none to severe (Würsig and Richardson 2002). Sources of transient noise include helicopters, planes, and explosions; sources of continuous noise include ships underway and dredging activities. The discussion that follows focuses on wildlife sensitivity to noise potentially generated from activities associated with a Makah whale hunt, including aircraft overflights, boat traffic, and use of gunfire or explosives. See Section 3.11, Noise, for a discussion of key concepts related to noise, as well as existing noise levels in the project area.

Marine mammals may respond to noise and other disturbance in many ways, including changes in behavior, avoidance reactions, masking, hearing impairment, and nonauditory physiological effects and stress (Würsig and Richardson 2002). For marine mammals that rely on sound to communicate, find prey, avoid predators, and likely to navigate, perturbations involving noise could have negative impacts on fitness or survival.

Effects of disturbance on marine birds can range from temporary and minor behavioral changes, such an alert response, to reactions with potentially negative effects on reproductive success, such as nest abandonment. Bird responses depend on a variety of factors as described further in the subsections below (Carney and Sydeman 1999; Point Reyes Bird Observatory 2005). Colonial nesting birds are particularly vulnerable to disturbance because of their high nesting densities and group behavior; when one bird responds to a given disturbance (e.g., flushing from its nest), other birds often follow (Rodgers and Smith 1995).

3.5.3.3.1 <u>Aircraft Overflights</u>

Based on a review of studies on the response of species found in west coast National Marine Sanctuaries, Moore (1997) concluded that aircraft overflights "can and do disturb wildlife." The regulations governing the OCNMS (15 CFR 922.152(7), revised January 26, 2012) state that failure to maintain a minimum flight altitude of 2,000 feet (610 m) over certain portions of the Sanctuary is presumed to disturb marine mammals or seabirds. These restrictions are described in greater detail in Subsection 3.1.1.1.2, Designation and Regulatory Overview (of the OCNMS). Disturbance varies by species and the specifics of the situation. The following paragraphs discuss disturbance of birds and marine mammals (i.e., wildlife likely to use habitats in the project area) by aircraft.

Reactions of some bird species may range from increased vigilance and attentiveness (including scanning by head-turning) to flushing from a nest or perch (Brown 1990; Stalmaster and Kaiser 1997; Giese and Riddle 1999; Ward et al. 1999). In similar circumstances, other species may not react at all (Parrish et al. 2005). In their review of overflight and wildlife disturbance, the National Park Service (1995) indicated mixed results, with some species exhibiting response to overflights, but other species showing minimal or no response. At least one study (of peregrine falcons) indicated no apparent change in parental behavior from low (less than 500 feet [152 m]) military overflights, while another study (of waterfowl) found minimal disturbance caused by military overflights (Parrish et al. 2005). With increasing numbers of overflights, some wildlife may habituate to aircraft noise (e.g., black ducks), whereas other species will not (e.g., wood ducks, black brant, emperor, and Canada geese) (Conomy et al. 1998; Ward and Stein 1989). In a study of experimental overflights at lakes, Komenda-Zehnder et al. (2003) found that the behavior of waterbirds was not substantially altered by fixed-wing aircraft flying at least 1,000 feet (305 m) above ground level and helicopters flying at least 1,500 feet (457 m) above ground level. In that study, birds disturbed by low-flying aircraft returned to relaxed behavior (e.g., resting, preening, feeding) within 5 minutes of overflights.

In general, conclusions based on responses of one species are not necessarily applicable to another species (Manci et al. 1988); similarly, responses to one aircraft type may differ from responses to other types, even within a single species (National Park Service 1995; Ward et al. 1999). In a field study using playback of recordings of overflights to measure effects on seabirds, Brown (1990) found that the level of response increases with increasing noise. This is notable because not all aircraft produce the same amount of noise; thus, a relatively quiet aircraft flying nearby may cause less disturbance than a noisier aircraft farther away (Parrish et al. 2005). In a study of nesting osprey, for example, Trimper et al. (1998) found that adult osprey did not appear to be disturbed by military overflights at various distances, approximately 2 miles (3.2 km) from the nest, but reacted strongly to float planes approaching within 4.8 miles (7.7 km). Parrish et al. (2005) noted that helicopters typically cause more disturbance than other aircraft types. Similarly, Komenda-Zehnder et al. (2003) found that the disturbance effect of helicopters was greater than that of fixed-wing aircraft. The helicopters used in that study were larger and louder than the airplanes, which makes it impossible to determine which of two factors (visual or acoustic cues), was responsible for the differences.

Based on observations of marine birds and aircraft overflights at Tatoosh Island, Parrish et al. (2005) drew the following general conclusions:

1. Aircraft type has a substantial effect on disturbance level, independent of altitude, with louder aircraft having a greater effect.
2. Immediate geomorphology has an effect on disturbance level, as concave surfaces (bowls) concentrate sound, whereas convex surfaces dispel sound.
3. The timing of the disturbance event within the breeding season has an effect on disturbance level; earlier in the season (before egg laying), birds are more likely to exhibit signs of disturbance (culminating in temporary evacuation of nesting or loafing sites), whereas later in the season (when pairs have eggs or chicks), birds may remain on nests even during elevated levels of disturbance.
4. Not all species respond equally. Disturbance varies by species and the specifics of the situation such that even related species differ in their responses. Disturbance may also be minimal or not occur. The lateral distance of the aircraft also strongly affects whether wildlife are disturbed. The correlation between distance and increased disturbance may result from increasing noise levels. The sudden appearance of aircraft, especially in the case of infrequent overflights, may also disturb wildlife.
5. Based on observed disturbance caused by overflights, several authors conclude that aircraft altitude restrictions should be developed or maintained, with recommendations for the distance aircraft should stay from wildlife ranging from 500 to 5,000 feet (152 to 1,524 m), depending on the species under consideration (Giese and Riddle 1999; Grubb and Bowerman 1997; Stalmaster and Kaiser 1997).
6. For any particular aircraft type, flying at lower altitudes generally increases the level of disturbance.

Few studies have documented the response of marine mammals to overflights (Parrish et al. 2005). Studies measuring the response of marine animals to noise were summarized by Myrberg (1990), who noted numerous reports of marine mammal disturbance caused by man-made sources, including offshore oil drilling and shipping. Responses of marine mammals to aircraft vary by species, aircraft type, approach distance and altitude, and pre-disturbance behavior. In a study of bowhead and beluga whales, Patenaude et al. (2002) found that helicopters cause more disturbance than other types of aircraft, and that beluga whales responded more often to all noise than bowhead whales. Aircraft flying at low altitude, at close lateral distances, and above shallow water tend to elicit stronger responses than aircraft flying higher, at greater lateral distances, and over deep water (Patenaude et al. 2002; Smultea et al. 2008). Würsig et al. (1998) found that whales and dolphins milling or resting at the surface are most sensitive to disturbance from aircraft. In a study of the responses of sperm whales to aerial whale-watching trips, Richter et al. (2006) found a very high degree of variation in responses among individuals. Transient whales were less tolerant of aerial whale-watching activities, while resident whales appeared to cope better, possibly because of habituation (Richter et al. 2006).

Pinnipeds are susceptible to disturbance while in the water or on land. Calkins and Pitcher (1982) found that disturbance from aircraft and vessel traffic has extremely variable effects on hauled-out sea lions, ranging from no reaction at all to complete and immediate departure from the haulout (i.e., a stampede). When sea lions are frightened off rookeries during the breeding and pupping season, pups may be trampled or, in extreme cases, abandoned (Calkins and Pitcher 1982). Insley (1993) used sound recordings, sound pressure measurements, and video recordings to study the effect of aircraft overflights on northern fur seal behavior at St. George Island, Alaska. He found that if pilots followed the prescribed flight path and altitude and did not pass over the seal rookeries there was no discernible impact on the seals.

Response to aircraft may also depend on overflight frequency. With increasing numbers of overflights, some wildlife may habituate to aircraft noise, whereas other species will not (Conomy et al. 1998). Conversely, sensitization may also occur. For example, the response of harbor seals increased with greater overflight occurrence (Johnson 1977 as cited in Moore 1997).

Some specific study results relevant to the Makah proposal include:

1. In a review paper of marbled murrelets, Nelson (1997) stated that aircraft flying at low altitudes are known to cause marbled murrelets to dive, although the specific altitude was not mentioned.

2. Pilots are required to stay more than 2,000 feet (610 m) above ground level when flying over the OCNMS; failure to maintain that minimum flight altitude over certain portions of the Sanctuary is presumed to disturb marine mammals or seabirds (15 CFR 922.152(7)). Federal Aviation Administration navigational charts have been revised to include information on the Sanctuary's overflight regulations.

3. Several studies have documented effects of aircraft on foraging and nesting eagles. In a study of nesting eagles in Michigan, average eagle flushing distance was approximately 0.5 mile (0.8 km) for jets, 0.75 mile (1.21 km) for light planes, and 0.4 mile (0.64 km) for helicopters (Grubb et al. 1992). In a study on the effects of helicopters on nesting eagles in northwestern Washington, Watson (1993) reported that 53 percent of nesting eagles were disturbed (i.e., alert and flush behavior) when helicopters approached within 1,500 feet (457 m) of eagle nests. In a study of wintering bald eagle response to military activities at Fort Lewis, Washington, investigators reported that most eagles flushed when helicopters approached within 1,000 feet (305 m) (Stalmaster and Kaiser 1997). In their National Bald Eagle Management Guidelines (2007), USFWS recommends that aircraft maintain a distance of at least 1,000 feet (305 m) from eagle nests during the nesting season, except where eagles have demonstrated tolerance for such activity.
4. In a study of the effects of low-level jet aircraft overflights along the Naskaupi River, Labrador, Canada, nesting osprey behavior did not differ significantly between pre- and post-overflight periods, and adult osprey did not appear agitated or startled when overflown by jet aircraft (at overflights as low as 100 feet (31 m) above ground) (Trimper et al. 1998). Osprey were attentive and occasionally flushed from nests when float planes entered their territories.
5. At a mixed cliff-nesting colony of fulmars, shags, herring gulls, kittiwakes, guillemots, razorbills, and puffins on the Aberdeenshire coast of Scotland, aircraft flying at heights about 300 feet (91 m) above the cliff-top did not affect the attendance of incubating and brooding birds (Dunnet 1977).

3.5.3.3.2 <u>Boat Traffic</u>

A study on the Pribilof Islands in summer 1990 measured the effect of direct noise (airplanes, land vehicles, ships, and construction activities) on northern fur seal behavior at rookeries on St. Paul Island (Insley 1992). Noise levels were measured on land near the rookeries as ships moved toward and away from the island during all hours of the day. Ship noise at the rookeries averaged approximately 82 dB in a frequency range between 60 and 300 hertz (Hz). No effect from ship noise was observed in fur seal behavior during this study. In contrast, Insley et al. (2003) found that fur seals foraging at sea changed their direction of movement when commercial trawl vessels were nearby. As summarized by Würsig and Richardson (2002), the strongest components of sound from many of the major anthropogenic sources are below 1,000 Hz. Peak sound intensities of small powerboats are generally in the frequency range of 350 to 1,200 Hz (Barlett and Wilson 2002).

Marine birds can also be sensitive to disturbance from boat traffic. Bird responses to boat traffic range from changing body position to abandoning a foraging attempt to flushing from a nest (Burger 1998; Carney and Sydeman 1999; Point Reyes Bird Observatory 2005). Responses of birds depend on a variety of factors, including the time of year; type, speed, and distance of boats from the birds; frequency of disturbance; bird species; and bird activity (e.g., foraging, roosting, or nesting) (Burger 1998; Rodgers and Schwikert 2002; Ronconi and St. Clair 2002). In general, mobile birds (e.g., foraging birds) move away from areas with high boat traffic, while nesting birds show behavioral, growth, or reproductive effects, with varying degrees of habituation (Kuletz 1996; Burger 1998).

Some specific study results relevant to the Makah proposal are as follows:

1. Of the hundreds of murrelets that researchers encountered with their skiff each day in Alaska's Auke Bay and Fritz Cove, most of the birds reacted to the skiff by paddling away; only a few of the birds reacted by flying away (Speckman et al. 2004). However, on eight separate occasions, murrelets that were holding fish crosswise in their bills swallowed the fish on approach of the skiff, generally when the skiff was within 15 to 130 feet (5 to 40 m) of the bird. The birds holding fish were presumed to be parents about to make food deliveries to their chicks (as consistent with other alcids). Consequently, skiff disturbance represented a loss in food for the chicks. The researchers concluded that such disturbance could be detrimental to murrelets in areas where prey are relatively scarce, where birds' inland nests are far from marine foraging areas, or where boat traffic is concentrated in waters immediately adjacent to nesting areas.

2. Observers conducting boat surveys for marbled murrelets noted that the birds dove more often than flew when a boat approached. If approached slowly and from an angle, however, the birds paddled away from the boat (E. Neatherlin, WDFW, pers. comm., 2003, as cited in USFWS 2003).

3. In a study in Finland, boat disturbance (at levels of 3.5 to 8.5 disturbances per day) lengthened the swimming distances of velvet scoter ducklings and reduced the time used for feeding (Mikola et al. 1994). The birds showed a response to the boats when the boats were within 100 feet (30.5 m) of the ducks. Birds disturbed more frequently than average were smaller than birds disturbed less frequently. The frequency of predatory gull attack on the ducks was 3.5 times higher in disturbed areas than undisturbed areas.

4. In a study in Florida, researchers investigated the flushing distance of 23 waterbird species to personal watercraft and outboard-powered boats (Rodgers and Schwikert 2002). Flushing distance for foraging and loafing birds varied by species and individual and boat type. Average flush distance by species ranged from 77 feet (24 m) (Forster's tern) to 190 feet (58 m) (osprey) of outboard-powered boats and 64 feet (20 m) (least tern) to 162 feet (49 m) (osprey) for personal watercraft. Based on their study results, the researchers suggested buffer zones of 590 feet (180 m) for wading birds, 490 feet (149 m) for osprey, 460 feet (140 m) for terns and gulls, and 330 feet (101 m) for plovers and sandpipers to minimize disturbance at foraging and loafing sites.

5. In a study at a black skimmers nesting colony in New Jersey, Burger et al. (2010) found that reproductive stage had the greatest effect on the responses of birds to approaching boats. During the pre-egg-laying period, skimmers flushed from their nests when boats were 330 feet (101 m) away, on average, compared to a flushing distance of 140 feet (43 m) when they had small chicks on the nest. The time for skimmers to return to the nesting colony after a disturbance event also varied seasonally, with birds taking substantially longer to return during the pre-egg period (approximately 9.5 minutes) than during the hatching period (approximately 0.7 minutes). The researchers recommended a set-back distance of approximately 390 feet (119 m) from the perimeter of the nesting colony.

6. Rojek et al. (2007) documented vessel disturbances of common murres at three breeding colonies in central California. Most boat disturbance occurred when vessels approached within 164 feet (50 m) of active nesting areas and remained in the area for extended periods. Such disturbances resulted in the loss of both eggs and chicks.

7. Several studies have documented effects of boats on foraging and nesting eagles. In a study of nesting eagles in Michigan, average eagle flushing distance was 360 feet (110 m) for power boats and about 1,000 feet (305 m) for canoes/kayaks (Grubb et al. 1992). Foraging eagles on the Columbia River maintained an average distance of 1,300 feet (396 m) from stationary boats. In the presence of boats, the birds reduced their feeding time and number of foraging attempts (McGarigal et al. 1991). In a study of wintering bald eagle response to military activities at Fort Lewis, Washington, investigators reported that most eagles flushed when boats approached within 330 feet (101 m) (Stalmaster and Kaiser 1997). In a study of wintering eagles along the Nooksack and Skagit Rivers in Washington, researchers reported that average distance for perched eagles flushed by a canoe was approximately 500 to 550 feet (152 to 168 m), and average

flush distance for eagles standing or feeding on the ground was approximately 750 to 900 feet (229 to 274 m), although more sensitive eagles flushed at distances out to approximately 1,150 feet (351 m) (Knight 1984). In their National Bald Eagle Management Guidelines (2007), USFWS recommends that within 300 feet (91 m) of eagle nests during the nesting season (1) concentrations of noisy vessels (e.g., commercial fishing boats and tour boats) should be avoided, except where eagles have demonstrated tolerance for such activity; and (2) other motorized boat traffic should attempt to minimize trips and avoid stopping in the areas where feasible, particularly where eagles are unaccustomed to boat traffic.

Marine birds may be sensitive to underwater noise when they are diving to catch fish. Effects can range from behavioral changes (e.g., delayed or aborted foraging attempts, avoidance of potential foraging areas) to physical injury (USFWS 2003). Based on a review of studies of the effects of noise on animals in underwater environments, USFWS (2003) estimated that peak sound pressure levels greater than 180 dB have the potential to cause physical injury. A recent study of noise levels from small powerboats found peak levels of 145 to 150 dB, primarily in the 350- to 1,200 Hz frequency range (Barlett and Wilson 2002). Similarly, Hildebrand (2005) reported peak noise levels of 140 dB for small fishing vessels. Higher noise levels are associated with larger vessels; Richardson et al. (1995) provided estimates of 171 dB for a tug and barge and 181 dB for a large supply ship.

3.5.3.3.3 <u>Gunfire and Explosives</u>

Studies on the effects of non-lethal gunfire on marine birds are rare. Investigators did study the effect of military shooting ranges on the birds of the Wadden Sea, although effects may have been confounded by aircraft effects (Kuesters and Van Raden 1998). The investigators stated that the reactions of the birds to bombing and shooting air-to-ground missiles and machine guns from low-flying planes varied from continuing feeding to alert behavior to spontaneous flight. Reaction intensity depended on the sequence in which the weapons were fired (i.e., birds were more likely to become habituated if the shooting started with low-noise weapons) and particularly on the tide, with higher tides (and associated concentrations of birds on their high-tide roosts) eliciting stronger responses. In a study of wintering bald eagle response to military activities at Fort Lewis, Washington, investigators reported that most eagles were not “overly disturbed” by artillery and small arms fire (Stalmaster and Kaiser 1997). In a study of nesting eagles in Michigan, average eagle flushing distance was approximately 1,600 feet (488 m) for gunfire and 5,000 feet (1,524 m) for artillery fire (Grubb et al. 1992).

Indirect evidence of the effects of gunfire on birds can be obtained from results of bird hazing activities at aquaculture facilities, hydroelectric facilities, agricultural sites, and oil spills. In general, gunfire and other pyrotechnics initially cause foraging birds to flush, but the birds usually become habituated to the gunfire over time (Bomford and O'Brien 1990; Salmon and Marsh 1991; Bechard and Marquez-Reyes 2003).

3.5.3.3.4 Marine Mammals and Underwater Noise

Within animals, hearing characteristics vary among individuals, sex and age classes, populations, and species. Hearing capabilities of marine mammals have been studied for just over 20 of approximately 125 species (Richardson et al. 1995; Wartzok and Ketten 1999; Würsig and Richardson 2002). The species studied are limited to those small enough to be held in captivity. Traditionally, direct hearing measurements have involved trained responses; more recently, electrophysiological methods have been used to measure neural activity in animals presented with sound. For larger or rare species, hearing must be estimated from mathematical models based on anatomy, inferred from the sounds they produce, or from reactions to sounds in their environment.

Hearing and sound production are highly developed in all studied cetacean species. Cetaceans rely heavily on sound and hearing for communication and sensing their environment (Watkins and Wartzok 1985; Tyack 2000). Of all mammals, cetaceans have the broadest acoustic range and the only fully specialized ears adapted for underwater hearing. Little information is available, however, for individual hearing capabilities in most cetacean species (Ketten 2000).

Of the cetaceans, baleen whales are thought to be most sensitive to low-frequency sounds (approximately 10 to 5,000 Hz) based on characteristics of their auditory morphology, behavioral responses, and sound production (Wartzok and Ketten 1999; Ketten 2000). Refer to Subsection 3.4.3.6.5, Known and Potential Anthropogenic Impacts, Offshore Activities and Underwater Noise, for more information about gray whales and marine noise. No direct empirical data exist on the hearing of baleen whales. Most odontocetes (toothed cetaceans, such as killer whales, other dolphins and porpoises, and sperm whales) have functional hearing across a broader range of mid to high frequencies (from 200 to 100,000 Hz) (Johnson 1967; Hall and Johnson 1972; Erbe and Farmer 1998; Tremel et al. 1998; Szymanski et al. 1999). Odontocetes communicate mainly above 1,000 Hz and use echolocation signals as high as 150 kHz (Würsig and Richardson 2002). A few odontocetes, including harbor porpoises and river dolphins, hear relatively similarly in this broad range, but appear to be specialized for hearing sounds at very high frequencies (approximately 4,000 to 150,000 Hz or higher) (Wartzok and Ketten 1999).

Pinnipeds (seals, sea lions, and walrus) are fundamentally different from other marine mammals, because they are amphibious mammals performing important life functions both above and below water. Consequently, they have a number of auditory adaptations enabling fairly sensitive hearing across wide frequency ranges both in air and water (Richardson et al. 1995; Kastak and Schusterman 1998). Pinnipeds can be segregated into two functional groups based on their underwater hearing capabilities: 1) otariids (sea lions and fur seals), which have been shown to be sensitive to a fairly wide range of mid frequencies (approximately 1,000 to 30,000 Hz); and 2) phocids (true seals) and walruses, which generally are capable of hearing across a wide range of low to mid frequencies (approximately 200 Hz to 50,000 Hz). The differences in hearing bandwidth in air are less striking between the phocids and otariids; in both taxa, functional bandwidth is narrower in air than in water.

Ketten (1998) reported that there are no conventional audiometric data available for sea otters, but research on river otters indicates a functional hearing range in air of approximately 450 to 35,000 Hz and a peak sensitivity of 16,000 Hz.

Noise and Marine Mammal Physiological Effects

Noise exposure may result in a range of effects on auditory and non-auditory systems. Noise may be detectable but have no effect on a mammal's hearing or physiology. The presence of noise may mask signals of interest (such as calls of other animals) (Bain and Dahlheim 1994; Erbe 2002; Southall et al. 2003). Intense or prolonged exposure may result in either temporary or permanent changes in hearing sensitivity (Schlundt et al. 2000). Sound exposure may also induce physical trauma to non-auditory structures (Jepson et al. 2003; Fernandez et al. 2005), although much remains uncertain regarding the exact mechanisms. Physical effects, such as direct acoustic trauma, can be influenced by a marine mammal's frequency range of hearing compared to a sound source, as well as the intensity and energy from the source that are received by the animal (Nowacek et al. 2007; Southall et al. 2003). Because marine mammals in the project area rely on underwater sounds for various purposes, any strong anthropogenic sounds at relevant frequencies might have an effect.

Noise and Marine Mammal Behavior

Most studies of the effects of noise on marine mammal behavior are observational rather than experimental. Behavioral responses can range in severity from no observable response to panic and stranding (Southall et al. 2003; Ellison et al. 2012). Behavioral responses of more typical and moderate severity may take many forms, including subtle changes in surfacing and breathing patterns, changes in vocalization rate or intensity, or active avoidance or escape from the vicinity of the noise source. Bowhead whales have been observed altering their diving and blowing behavior in response to human noises (Richardson et al. 1986). Many whale species have been seen to cease vocalizing in response to human noises. These include right whales (Watkins 1986), bowhead whales (Wartzok et al. 1989), sperm whales (Watkins and Schevill 1977; Bowles et al. 1994), humpback whales (Sousa-Lima and Clark 2012), and pilot whales (Bowles et al. 1994). Other responses include humpback whales lengthening their song cycles (Miller et al. 2000) and moving away from mid-frequency sonar (Maybaum 1993) or tourist boats (Sousa-Lima and Clark 2012), beluga whales adjusting their echolocation clicks to higher frequencies (Au et al. 1985), and gray whales avoiding air gun noise (Malme et al. 1984). Williams et al. (2009) concluded that boats affected the behavior of Southern Resident killer whales in Haro Strait, and that changes in behavior were more strongly correlated with the number of boats within 1,300 feet (396 m) of whales, rather than distance between boats and whales. In contrast, some observers (e.g., Tyack and Clark 1998; Fristrup et al. 2003) have reported instances in which whales did not respond to human sounds.

Many factors can affect the broad range of marine mammals' behavioral responses to sound, which makes their behavioral responses hard to predict (NRC 2005; Ellison et al. 2012); however, the received level of sound intensity contributes to such responses (Southall et al. 2003). Responses may also vary depending on the context of the sound exposure (i.e., whether the animal is motivated to be in an area because of feeding or breeding or whether the sound source is novel) as well as the animal's age and sex. For example, cow-calf pairs of gray whales are considered more sensitive to disturbance by whale-watching vessels than other age or sex classes (Tilt 1985). Responses also appear to be affected by the location of the source relative to the animal, the motion of the source, and the onset and repetition of the sound (Hildebrand 2005; NRC 2003; Ellison et al. 2012).

Jensen et al. (2009) studied the potential for sounds from recreational motorboats (including boats used for whale-watching excursions) to interfere with communication by cetacean species in shallow-water habitats (bottlenose dolphins) and deep-water habitats (short-finned pilot whales). They found that small vessels traveling at 5 knots in shallow water can reduce the communication range of bottlenose dolphins within 164 feet (50 m) by 26 percent. Similar vessels traveling at similar speeds in quieter deep-water habitats can reduce the communication range of pilot whales by 58 percent (Jensen et al. 2009). Holt et al. (2009) found that Southern Resident killer whales increase their call amplitude by 1 dB for every 1 dB increase in background noise levels.

In a study that used acoustic tags and controlled exposure experiments with north Atlantic right whales, Nowacek et al. (2004) examined the effects of shipping noise on marine mammal behavior. Five of six individual whales responded strongly (interrupted dive pattern and rapid ascent to the surface) to the presence of an artificial alarm stimulus (series of constant frequency and frequency modulated tones and sweeps), but ignored playbacks of vessel noise. More information about the effects of noise on gray whale behavior can be found in Subsection 3.4.3.6.5, Known and Potential Anthropogenic Impacts, Offshore Activities and Underwater Noise.

3.6 Economics

3.6.1 Introduction

This section describes current conditions and recent trends in economic activity within Clallam County and on the Makah Reservation, including Neah Bay. Information presented in this section includes the following:

- Countywide employment, personal income, and tourism statistics
- Commercial shipping information
- Makah tribal employment and personal income statistics
- Local economic conditions related to tourism
- County and tribal income generated by tourism
- Ocean sport and commercial fishing statistics
- Summary of economic effects of media coverage of the 1998, 1999, and 2000 Makah Tribe gray whale hunts

3.6.2 Regulatory Overview

No federal, state, or local regulations, statutes, or policies pertain specifically to the establishment or maintenance of the economic resources in the project area, other than those addressing wildlife management and hunting activities discussed in other subsections of this section (Subsection 3.3.2, Regulatory Overview (Marine Habitat and Species), Subsection 3.4.2, Regulatory Overview (ENP Gray Whale), Subsection 3.5.2, Regulatory Overview (Other Wildlife Species).

3.6.3 Existing Conditions

3.6.3.1 Countywide Conditions (Clallam County)

3.6.3.1.1 <u>Employment, Unemployment, and Labor Force</u>

Over the past 20 years, the economy in Clallam County has experienced slow but steady growth, shaped in part by a vibrant port district in the county's major coastal city of Port Angeles (Vleming 2014). Immigration is also on the rise as many retirees are attracted to Sequim's "sunbelt" climate. The service sector has been experiencing growth over the past decades. Top employers in the county include two prisons, a hospital, and a school district. Following the popularity of the *Twilight* books and movies, the city of Forks has become a tourism destination (Vleming 2014). The economy of Clallam County has historically been resource-based, with an emphasis on forest products (Cascade Land Conservancy and North Olympic Land Trust 2010). Approximately 4 percent of the jobs in the county are in the forestry/logging or wood product manufacturing industries (Washington State Employment Security Department 2010). The largest proportion of private sector jobs in the county are the service industry, with retail trade accounting for approximately 15 percent of jobs countywide, and accommodation and food services accounting for another 10 percent (Washington State Employment Security Department 2010).

In the 10 years from 2002 through 2011, annual average wage and salary employment in Clallam County increased sharply, then fell off. From 2002 to 2007, total employment grew by 14 percent, from approximately 21,000 jobs to approximately 24,000 jobs (Washington State Employment Security Department 2012). By the end of 2011, total employment had returned to approximately 22,000, resulting in an overall job growth rate of 6 percent between 2002 and 2011. Most of the job gains and losses occurred in service industries, where 1,920 jobs were added between 2002 and 2007, and 980 jobs were lost between 2007 and 2012. Employment growth also was relatively strong in the government sector, which added 510 new jobs between 2002 and 2011. The government sector was the only sector in which the total number of jobs did not decrease between 2007 and 2012. The other sectors with substantial job growth in the last decade were manufacturing, with 430 additional jobs, and retail trade, with 120 additional jobs (Washington State Employment Security Department 2012).

In 2011, an average of 22,120 wage and salary workers were employed in Clallam County. Goods-producing industries, including those involved in natural resources, mining, construction, and manufacturing, accounted for 13 percent of countywide employment (Washington State Employment Security Department 2012). This proportion is similar to the statewide pattern, where these industries account for 15 percent of non-farm jobs (Bureau of Labor Statistics 2012). Government employment generated nearly 32 percent of the county's jobs, compared to 19 percent statewide. Trade, service, transportation, warehousing, and utility industries accounted for the remaining wage and salary jobs, generating 54 percent of countywide employment opportunities, compared to 66 percent statewide (Bureau of Labor Statistics 2012; Washington State Employment Security Department 2012).

In addition to wage and salary employment, employment related to business ownership and self-employment is important to the economy of Clallam County. For example, in 2010, proprietors' employment produced nearly 11,300 jobs in addition to contributing to countywide wages and salaries (Bureau of Economic Analysis 2012a).

Clallam County's resident civilian labor force averaged 29,590 persons in 2011, reflecting labor force growth of 11 percent since 2002 but a decrease of 2 percent from the peak in 2009. The growth rate over that 10-year period was lower than the statewide labor force increase of 13 percent over the same period. Unemployment in the county in 2011 averaged 10.1 percent, higher than the statewide unemployment rate of 9.2 percent. Growth in the employment of Clallam County's residents did not keep pace with growth of the county's resident labor force between 2002 and 2011. As a result, the unemployment rate increased from 8.7 percent in 2002 to its current level. Over the same period, the statewide unemployment rate increased from 5.8 percent to 9.2 percent (Washington State Employment Security Department 2012).

3.6.3.1.2 <u>Personal Income</u>

Personal income is generally seen as a key indicator of a region's economic vitality. Personal income, as presented here, captures all forms of income: wages, salaries, government transfer payments, retirement income, farm income, self-employment income, proprietors' income, interest, dividends, and rent, but it does not include contributions toward social insurance. Social insurance payments are those made for certain government programs, including health, disability, unemployment, retirement, life insurance, and workers' compensation insurance programs. Nominal (i.e., not adjusted for inflation) total personal income for Clallam County increased from \$1.6 billion in 2000 to \$2.6 billion in 2010 (the most recent year for which data are available) (Table 3-20). The increase in personal income between 2000 and 2010 equates to an average annual growth rate of 5.4 percent, slightly higher than the state's average annual growth of 4.3 percent for the same period (Washington State Employment Security Department 2012).

Per capita income, which relates an area's total income to its population level, provides an indicator of the economic well-being of the residents of an area. In 2010, per capita income in Clallam County was \$36,463, compared to \$42,589 statewide, ranking the county seventeenth among the state's 39 counties (Bureau of Economic Analysis 2012b). Between 2000 and 2010, nominal per capita income in Clallam County increased by 47 percent (Table 3-20).

Table 3-20. Population and personal income in Clallam County in 2000 and 2010.

Category	2000	2010	Percent change 2000-2010
Population	64,269	71,513	11.3
Total personal income ($ billion)	1.60	2.61	63.1
Per capita income	24,879	36,463	46.6

Source: Bureau of Economic Analysis 2012b.

3.6.3.1.3 Tourism

Tourism is an important component of Clallam County's economy. The rugged, pristine environment and variety of habitats found along the Olympic Coast and the Strait of Juan de Fuca provide recreational opportunities for both residents and tourists. Additionally, Olympic National Park, which attracted an average of 3.0 million recreation visitors per year between 2006 and 2010 (Clallam County Economic Development Council 2011), generates visitation to Clallam County, including its visitor centers in Port Angeles, Forks, Sequim, and Neah Bay (North Olympic Peninsula Visitor and Convention Bureau 2005a). Much of the land in Clallam County, including a large segment of its Pacific coastline, is within the Olympic National Park and Olympic National Forest. The OCNMS, which provides opportunities for wildlife viewing, also attracts visitors to the county's outer coastline. Additional information concerning Olympic National Park and the OCNMS is presented in Subsection 3.12.3.2, Vantage Points and Visual Opportunities in the Project Area.

Visitors to Clallam County participate in an array of sightseeing and recreational activities (Jim Lillstrom and Associates 2003). General sightseeing, hiking, wildlife viewing, and visiting historical and cultural sites are among the most popular activities of visitors to the county (Table 3-21). In addition to hiking, other popular recreational activities include boating and water sports, biking, backpacking, rafting and kayaking, and fishing.

Tourism is a relatively large industry in Clallam County. According to a recent study of travel-related economic impacts, visitors spent $178.4 million at destinations in Clallam County in 2009 (

Table 3-22), accounting for 1.3 percent of statewide travel spending. Spending occurs in several sectors of the county's economy, but is greatest in the food and beverage services sector (30 percent of total visitor spending) and accommodations sector (21 percent). The ground transportation, arts/entertainment/recreation, and retail sales sectors each received approximately 15 percent of visitor spending in 2009 (

Table 3-22).

Table 3-21. Percentage of visitors to Clallam County participating in specific activities during their visits.

Activity	Percent of Day Visitors (%)	Percent of Overnight Visitors (%)
Sightseeing/driving tour	53	75
Hiking	46	63
Wildlife viewing	36	58
Visiting historic/cultural site	35	56
Shopping	44	47
Visiting Native American site	21	43
Participating in a family event	26	20
Visiting a gallery	17	31
Boating/water sports	21	18
Biking	20	11
Backpacking	13	17
Attending a festival/event	16	14
Wine tasting	15	13
Rafting/kayaking	13	13
Fishing	16	10
Visiting a garden/farm	10	14
Antiquing	11	13
Golfing	10	5
Going to a casino	8	6

Table 3-22. Travel Spending in Clallam County in 2009.

Commodity Purchased	Travel Spending ($ millions)	Percent of Total Travel Spending (%)
Accommodations	37.5	21
Food and beverage services	53.8	30
Food stores	13.3	7
Ground transportation and motor fuel	22.9	13
Arts, entertainment, and recreation	26.0	15
Retail sales	24.9	14
Air transportation	(insufficient data)	NA
TOTAL SPENDING	**178.4**	**100**

Note: Includes spending (in nominal dollars) at a destination in Clallam County related to all types of travel, including business and pleasure travel. Expenditures at a destination where a traveler stays overnight or at a destination more than 50 miles from a traveler's home are included.

Source: Dean Runyan Associates 2010.

Between 2000 and 2009, travel-related spending at destinations in Clallam County grew at an average annual rate of 3.4 percent, matching the statewide growth rate for the period (Table 3-

23). Spending in the county increased in every year of the period except in 2009, when spending decreased by 2.2 percent. The average annual growth rate of travel-related spending in Clallam County was markedly slower in the latter part of the decade, declining from an average of 4.6 percent between 2000 and 2005 to 1.3 percent between 2006 and 2009 (Table 3-23). The statewide growth rate of travel-related spending also slowed, but the statewide slowdown did not begin until 2007 (Table 3-23).

Table 3-23. Travel spending in Clallam County and Washington State, 2000 to 2009.

	Clallam County		Washington State	
Year	**Travel Spending (millions $)**	**Change from Previous Year (%)**	**Travel Spending (millions $)**	**Change from Previous Year (%)**
2000	133.1	NA	10,504	NA
2001	138.0	3.7	10,480	- 0.2
2002	138.5	0.4	10,362	- 1.1
2003	142.8	3.1	10,846	4.7
2004	156.1	9.3	11,654	7.4
2005	166.8	6.9	12,702	9.0
2006	172.8	3.6	13,869	9.2
2007	181.0	4.7	14,858	7.1
2008	183.4	1.3	15,380	3.5
2009	179.4	- 2.2	14,135	- 8.1
Average annual percent change, 2000-2005		4.6		3.9
Average annual percent change 2006-2009		1.3		0.6
Average annual percent change 2000-2009		3.4		3.4

Note: Table includes spending (in nominal dollars) at a destination related to all types of travel, including business and pleasure travel. Expenditures at a destination where a traveler stays overnight or one more than 50 miles from a traveler's home are included. Unlike the 2009 spending shown in Table 3-22, spending in this table includes expenditures by county or state residents for air travel and travel agency services for trips to destinations outside of Clallam County or Washington State.

NA = not applicable.

Source: Dean Runyan Associates 2010.

Travel-related spending by visitors to Clallam County generates earnings and employment in visitor-serving industries. Earnings generated by travel spending totaled an estimated $53.4 million in 2009, including $34.2 million in the accommodations and food service sectors and $12.0 million in the arts, entertainment, and recreation sector (Table 3-24). Employment generated by travel-related spending in Clallam County totaled an estimated 2,980 jobs in 2009 (Table 3-24), accounting for 12.2 percent of Clallam County's wage and salary jobs and

8.4 percent of all jobs (including proprietors' employment) (Bureau of Economic Analysis 2012a).

Table 3-24. Estimated travel-related economic impacts by sector in Clallam County in 2009.

Sector	Industry Earnings Generated by Travel Spending (millions $)	Jobs Generated by Travel Spending
Accommodations and food service	34.2	1,690
Arts, entertainment, and recreation	12.0	1,000
Retail and gasoline	5.7	230
Auto rental and other ground transportation	1.1	40
Air transportation	(insufficient data)	(10 assumed)
Other travel	0.4	10
TOTAL	**53.4**	**2,980**

Source: Dean Runyan Associates 2010.

3.6.3.1.4 Commercial Shipping

Next to fishing, the predominant use of waters off the Olympic Coast is commodities transportation to and from port facilities in Puget Sound. In 2010, the United States Customs District of Seattle (which includes all ports in Puget Sound, as well as some border crossings along the Canadian border) handled more than $77 billion worth of international trade (Maritime Administration 2012). Included in the commercial shipping traffic are tug boats with barges carrying hydrocarbon products along the coast. The entrance to the Strait of Juan de Fuca is highly congested by oil tankers, freighters, tugs and barges, and fishing vessels (NOAA 1993). Management of commercial vessel traffic near the project area and marine vessel traffic regulations adopted during the Makah Tribe's previous whale hunt are discussed in Section 3.13, Transportation. Similarly, data on transits into Washington State waters through the Strait of Juan de Fuca by large cargo and passenger vessels, tank ships, barges, and commercial fishing vessels are presented and discussed in Section 3.13, Transportation.

Commercial shipping routes in the Strait of Juan de Fuca and nearby waters, including Haro Strait, Boundary Pass, Rosario Strait, and the Strait of Georgia, are managed jointly by the United States and Canadian Coast Guards, primarily through the Cooperative Traffic System. This system allows for management of vessel traffic in a waterway segment without regard to the international boundary that separates the waters of the United States and Canada. A vessel separation scheme, similar to a divider median on a highway, is used to maintain a safe distance between opposing vessel traffic.

The Strait of Juan de Fuca traffic separation scheme encompasses five sets of traffic lanes, including the western and southwestern approaches to and from the Pacific Ocean, the western lanes in the Strait of Juan de Fuca, the southern lanes to Port Angeles, and the northern lanes to Victoria. Each set of lanes consists of inbound and outbound traffic lanes with separation zones. The traffic lanes encompassed by the Strait of Juan de Fuca traffic separation scheme generally run through the center of the Strait of Juan de Fuca, near the boundary line separating the waters of the United States and Canada. The southern boundary of the traffic separation scheme generally lies about 4 nautical miles (7.4 km) offshore of Clallam County along the Strait of Juan de Fuca and extends further away from the coast as it leaves the Strait of Juan de Fuca and enters ocean waters. The Makah Tribe's U&A (Figure 3-1) overlaps the traffic separation scheme near the international boundary line in the Strait of Juan de Fuca and encompasses the commercial traffic lanes that provide a southwestern approach to and from the Pacific Ocean near the mouth of the Strait.

Commercial traffic largely honors the OCNMS area to be avoided (Figure 3-1), discussed in more detail in Subsection 3.1.1.1.3, Current Issues (OCNMS), and Section 3.13, Transportation. The Coast Guard RNA, which was established to enforce vessel activities near any Makah whale hunt, falls within the area to be avoided, except for the portion of the RNA that wraps around Cape Flattery and Tatoosh Island (Figure 3-1). The commercial shipping traffic lanes appear to avoid the RNA, indicating that most commercial traffic avoids this area.

3.6.3.2 Local Conditions on the Makah Reservation, Including Neah Bay

Demographic data presented in the Employment and Personal Income parts of this subsection differ from employment and personal income data that will be presented in Section 3.7, Environmental Justice. The data in this subsection apply to all (non-native and Native American) residents of the Makah Reservation, whereas the data presented in the Environmental Justice subsection apply only to Native American residents of the Makah Reservation; therefore, the data do not match.

3.6.3.2.1 General Description of the Local Economy

The Makah Reservation, which includes the community of Neah Bay, is relatively isolated. The reservation has been accessible by road only since 1931 and is an approximately 70-mile drive from the closest commercial center in Port Angeles (Sepez 2001). The economy in the coastal region that includes the Makah Reservation is inextricably linked to its natural resources, based primarily on seafood, timber harvesting, pulp and paper production, and tourism (NOAA 1993). Neah Bay, the Makah Reservation's central town, is primarily a commercial fishing and timber community, as well as a tourist and sport fishing destination.

Similar to other locations on the Olympic Peninsula that depend on resource-based industries, the Makah Reservation and Neah Bay have experienced economic difficulties since the late 1980s because of salmon harvest restrictions and controversies surrounding timber practices that have led to reductions in harvest. In addition, the 1989 deactivation of the United States Air Force Base operating on the Makah Reservation resulted in the loss of approximately 200 local jobs, further reducing job opportunities in the local area. In order to meet the needs of its people, the Makah Tribe has made a commitment to diversifying and expanding its access to and use of traditional resources. Among these endeavors was a program that facilitated the sharing and enhancement of tribal members' knowledge and skills in management of non-timber forest resources, such as floral supplies and materials for basketry (Renker 2012). The Tribe has also diversified its marine fisheries over the past decade, particularly in the development of its trawl and longline fisheries. Despite these successes, fluctuations in the reservation's natural resources, commercial fishing, tourism, and sport fishing continue to present challenges to the Tribe's ability to ensure reliable incomes and subsistence sources for its members (Renker 2012).

Most reservation residents live in Neah Bay, the location of the public school, post office, general store, health clinic, and other services (Renker 2012). Commercial activity on the Makah Reservation includes the businesses shown in Table 3-25, which mainly are located in Neah Bay. Tribal artisans also produce carvings, jewelry, and silk screen designs for sale in local shops and regional galleries (Sepez 2001). All businesses on the reservation are owned by tribal members or leased by the Tribe to non-tribal members (B. Denney, Makah Community Planning and Economic Development, pers. comm., July 2012).

3.6.3.2.2 Employment

In 2010, the estimated labor force residing on the Makah Reservation was 669 persons, including 467 Native Americans (primarily Makah tribal members), representing 66 percent of the reservation's population 16 years old or older (United States Census Bureau 2012a). Unemployment trends and industrial employment data specifically for the Native American population residing on the Makah Reservation are presented and discussed in Section 3.7, Environmental Justice.

According to the 2006 to 2010 American Community Survey estimates, 543 of the 669 Makah Reservation residents (non-native and Native American together) in the labor force were employed in 2010. Of the 543 Makah Reservation residents with jobs in 2010, 57 percent were employed by government entities, 6 percent were self-employed, and 37 percent were employed by private businesses (United States Census Bureau 2012a). This employment distribution points to the importance of the government sector to the economy of the Makah Reservation and Neah Bay. In addition to state and federal employment, the Makah Tribe, which is the largest employer on the reservation, employs approximately 170 persons (Norman et al. 2007). Management and professional occupations, many probably related to government employment, accounted for 36 percent of the jobs held by reservation residents in 2010 (Table 3-26). Service, sales, and office occupations together accounted for an additional 40 percent of total jobs. Construction, maintenance, and occupations related to the area's natural resources provided jobs for 15 percent of the reservation's employed labor force. The United States Census data may undercount the reservation's employment associated with fishing occupations. According to the Makah Tribe, commercial vessels owned and operated by Makah tribal members generated approximately 515 jobs in 2011, including vessel skippers, deckhands, and river set-net fishermen (J. Johnson, Makah Fisheries Management Data Manager, pers. comm., July 11, 2012). Other employers on the Makah Reservation include the Indian Health Service medical and dental clinics, with 22 employees, and the Cape Flattery Public Schools, with 83 employees (Norman et al. 2007; Office of Superintendent of Public Instruction 2011).

Table 3-25. Businesses on the Makah Reservation.

Accommodations Apocalypto Motel Bullman Beach Inn Bulter's Motel Cape Resort and RV Park Carol's Tyee Motel and RV Park Hobuck Beach and Cabin Resort Linda's Wood-fired Kitchen and Motel Makah Maiden Bed and Breakfast Rose's Bed and Organic Breakfast The Village RV	**Restaurants** Linda's Wood-fired Kitchen Native Grounds Espresso Pat's Place Washburn's Deli Warmhouse Restaurant Whaler's Moon Delights
Retail Goods/Services and Fuel Big Salmon Resort (fuel and rentals) Cedar Shack Espresso Stand Johnson's Beauty Shop Makah Maiden Pantry Makah Mini-Mart/Fuel Station Museum Store at the Makah Cultural and Research Center Native's Wear Raven's Corner Gallery and Gift Shop Take-Home Fish Company Washburn's General Store	**Fishing Charter Businesses** Windsong Fishing Charter (Note: several other fishing businesses charter trips seasonally out of Neah Bay)
Other Businesses Big Oh's Firewood Bunn Construction Co., Inc. Burley Construction Cape Flattery Fishermen's Co-op High Tide Seafoods Makah Marina	**Individual Tribal Member Fishing Vessels** 36 longline vessels 55 summer troll vessels 16 winter troll vessels 10 small (bottom or mid-water) trawlers 5 large (whiting) trawlers 14 gillnet (salmon) vessels 5 small combination vessels (e.g., crab, trollers, longline) 20 Individual (tribal members) registered fish buyers 47 individual (tribal members) river fishermen (salmon)

Makah Rock and Gravel	

Sources: Makah Tribe 2012; Neah Bay Chamber of Commerce 2012; R. Buckingham, Port of Neah Bay Port Director, pers. comm., July 11, 2012; J. Johnson, Makah Fisheries Management Data Manager, pers. comm., July 11, 2012.

Table 3-26. Employment by occupation of Makah Reservation residents in 2010.

Occupation	Number	Percent (%)
Management, business, science, and arts occupations	194	35.7
Service occupations	144	26.5
Sales and office occupations	74	13.6
Natural resources, construction, and maintenance occupations	82	15.1
Production, transportation, and material moving occupations	49	9.0
TOTAL	**543**	**100.0**

Note: The table includes both non-native and Native American residents of the Makah Reservation.
Source: United States Census Bureau 2012a.

The distribution of employment by industry for residents (non-native and Native American together) of the Makah Reservation in 2010 is presented in Table 3-27.

Table 3-27. Employment by industry of Makah Reservation residents in 2010.

Industry	Number	Percent
Agriculture, forestry, fishing, hunting, and mining	84	15.5
Construction	10	1.8
Manufacturing	22	4.1
Wholesale trade	0	0.0
Retail trade	26	4.8
Transportation, warehousing, and utilities	0	0.0
Information	10	1.8
Finance, insurance, real estate, and rental and leasing	27	5.0
Professional, scientific, management, administrative, and waste management services	49	9.0
Educational, health, and social services	132	24.3
Arts, entertainment, recreation, accommodation, and food services	19	3.5
Other services (except public administration)	20	3.7
Public administration	144	26.5
TOTAL	**543**	**100.0**

Note: The table includes both non-native and Native American residents of the Makah Reservation.
Source: United States Census Bureau 2012a.

3.6.3.2.3 Personal Income

Personal income levels of Makah Reservation residents (non-native and Native American together) lag behind those of residents throughout Clallam County. According to the United States Census Bureau (2012a), the median income of reservation households was $32,069 in 2010, representing only 72 percent of the median countywide household income of $44,398.

In 2010, the per capita income of all reservation residents was also below the countywide level. Based on United States Census Bureau estimates of per capita income, the $14,269 per capita income of Makah Reservation residents was 58 percent of countywide per capita income (United States Census Bureau 2012a).

Because Neah Bay is isolated, most of the earnings of local residents come from the wage and salary payments of local businesses. Based on an informal survey of businesses in Neah Bay, local businesses generate an estimated annual total payroll of about $21 million (Arnold 2005).

3.6.3.2.4 <u>Contribution of Tourism to the Local Economy</u>

Tourism is one of the key elements of the economy of Neah Bay and the Makah Reservation. Visitors are attracted to Neah Bay and the reservation by several activities associated with the area's cultural, scenic, and recreational offerings.

In the village of Neah Bay, the Makah Cultural and Research Center houses the Makah Museum, which includes permanent exhibits featuring artifacts from the Ozette archeological site (Ozette was an ancient Makah village discovered in 1970 on the Pacific Coast side of the reservation.) The museum, which houses the nation's largest collection of Native American artifacts, is connected to a gift shop that offers visitors carvings, basketry, and jewelry made by Makah artists. The Makah Cultural and Research Center also houses the Makah language program, which is designed to preserve and teach the Makah language.

Neah Bay also offers visitors opportunities for sport fishing charters and guided tours. Several visitor-dependent businesses are located in Neah Bay, including five businesses providing accommodations, three restaurants, several retail shops providing fuel and supplies, and three sport fishing charter businesses (some of which may offer whale watching if requested; Table 3-25).

Several other tourist and recreation activities are available elsewhere on the Makah Reservation, including vehicle sightseeing tours along forested State Route 113 and the irregular Strait of Juan de Fuca coastline accessed by State Route 112. Many people travel to the coast to watch the annual migration of California gray whales (NOAA 1993). As discussed previously, most whale-watching on and near the Makah Reservation is from land-based locations, with few businesses offering whale-watching tours or charters. Beach activities are available to reservation visitors at sandy beaches near Neah Bay and along Hobuck Beach Road on the Pacific Ocean coast side of the reservation. Camping is available at Hobuck Beach, as well as at the Cape Resort and Silver Salmon Resort in Neah Bay.

Hiking is a popular activity for recreationists visiting the reservation. Popular trails include the 0.75-mile (1.2-km) Cape Flattery Trail and the 3.3-mile (5.3-km) Shi Shi Trail. The Cape Flattery Trail, with observation decks for viewing Tatoosh Island, sea stacks and sea caves, and the Pacific Ocean, is popular with ecotourists and those interested in wildlife viewing opportunities. Wildlife viewing also is available at Flattery Rocks National Wildlife Refuge and the Olympic Coast National Marine Sanctuary. Additionally, the public can view migrating salmon at the Makah National Fish Hatchery, located on the Tsoo-Yess River on the west side of the reservation (North Olympic Peninsula Visitor and Convention Bureau 2005a). Shi Shi Beach is a popular destination for campers during summer months. National Park Service public use data show that overnight visitation at the Shi Shi Beach camp area increased from 2,341 camper-nights in 1999 to 7,206 in 2011 (N. Hendricks, Olympic National Park, pers. comm., December 10, 2008; B. Bell, Olympic National Park, pers. comm., June 30, 2012).

Based on estimates of the number of people who may come to the area for various tourist activities (including fishing, surfing, hiking, and visiting museums), Parametrix (2006) generated an estimate of 25,000 to 40,000 annual visitors to Makah lands. The following statistics provide an indication of recent visitation activity.

- From 2007 through 2011, the Makah Cultural and Research Center, which includes the Makah Museum, accommodated an annual average of 11,200 non-Makah visitors (J. Bowechop, Makah Cultural and Research Center Director, pers. comm., July 11, 2012).
- In recent years, the number of recreational permits sold to non-tribal members visiting the reservation has increased steadily from 6,405 in 2007 to 10,678 in 2011 (P. Manuel, Makah Tribe, pers. comm., July 11, 2012). Sales of permits peak during summer months and are lowest during the winter. Recreational permits are required for non-tribal persons on the reservation. Permits are sold on a per vehicle basis and are good for a calendar year; this number of permits does not capture the total number of non-tribal persons visiting the reservation in a calendar year, nor does it capture the length of a visit and the number of visits an individual may make to the reservation under a single permit (N. Pamplin, Makah Tribe, pers. comm. November 7, 2005).
- Between 2006 and 2011, the Makah Tribe sold an average of 363 recreational fishing permits per year, generating an annual average of $7,261 in revenue. The number of permits sold ranged from 496 in 2009 to 181 in 2010 (J. Johnson, Makah Fisheries Management Data Manager, pers. comm., July 11, 2012). The permits, which are sold on an individual basis, allow visitors to fish on rivers within the reservation.

Persons visiting the Makah Reservation for tourism and recreational purposes generate revenues for businesses in Neah Bay, all of which are owned by tribal members or leased by the Tribe to non-tribal members (B. Denney, Makah Community Planning and Economic Development Planner, pers. comm., July 11, 2012). The amount of revenues annually generated by reservation tourism and recreation, as well as the number of jobs and amount of personal income that depend on visitor spending, is not known. According to the United States Census, 45 reservation residents were employed in 2010 in the retail trade sector and the arts, entertainment, recreation, accommodation, and food services sector, two sectors that depend directly on tourism (Table 3-27). These jobs account for approximately 8 percent of the employment in the local area. Many other local jobs likely are either directly or indirectly supported by tourist spending.

3.6.3.2.5 Contribution of Ocean Sport Fishing to the Local Economy

The diversity and abundance of fish species along the coast are important recreational and commercial resources. Salmon and groundfish (including halibut) fisheries are the primary recreational fisheries within the project area, including the Makah U&A, the OCNMS area to be avoided, and the Coast Guard RNA (Figure 3-1). Recreational fishing for groundfish is concentrated primarily seaward of the entrance to the Strait of Juan de Fuca. The ocean recreational fishery for salmon, which operates out of both Neah Bay and La Push, occurs offshore (e.g., Swiftsure Bank) and in the protected waters of the Strait of Juan de Fuca.

Ocean sport fishing seasons vary according to species, with seasons adjusted from year to year based on fishery management considerations. The recreational salmon fishery from Cape Alava (near Ozette) north to the United States/Canada border and for the Strait of Juan de Fuca near Neah Bay is generally open from early July until early or mid-September each year (Pacific Fishery Management Council 2012). The recreational groundfish fishery is generally open year-round, although the season is limited for certain species. For example, in 2011 and 2012, the recreational season for lingcod north of Cape Alava was open from mid-April through mid-October (76 Fed. Reg. 27508, May 11, 2011), and the halibut season was open for a total of 8 days in May and June (WDFW 2011). Periodic openings and closings for specific species may occur during the normal fishing season period.

Several fishing derbies and tournaments also draw visitors to Clallam County's sport fisheries each year. Annual derbies and tournaments in Clallam County include the Olympic Peninsula Salmon Derby in February, the Port Angeles Halibut Derby over Memorial Day weekend in May, the Sekiu Halibut Derby in June, the Sekiu "No Fin, You Win" Salmon Derby in mid-September, and the La Push Last Chance Salmon Derby in late September or early October.

Sport fishing facilities located in Neah Bay include the Makah Marina, which is managed by the Makah Tribal Council. The marina provides permanent moorage slips for about 200 commercial and sport fishing vessels and pleasure craft. The marina also provides utility hookups, restrooms and showers, and a pump-out facility for boats. Boat launching ramps and trailer parking facilities also are available at Big Salmon Resort in Neah Bay and at Snow Creek Resort about 4 miles (6.4 km) east.

Currently, three sport fishing charter businesses operate in Neah Bay, running trips for halibut, salmon, and groundfish. Two additional businesses may bring charter boats from Westport and Port Angeles for a portion of the halibut season (R. Buckingham, Port of Neah Bay Port Director, pers. comm., July 11, 2012).

Between 2003 and 2011, the annual number of recreational salmon angler trips originating from Neah Bay ranged from 6,400 trips in 2008 to 26,100 trips in 2004; salmon trips originating from La Push ranged from 2,100 to 5,100 trips (Table 3-28). The annual number of angler trips targeting groundfish, halibut, and albacore tuna that originated from Neah Bay ranged from 15,100 trips in 2009 to 26,600 trips in 2003 (Table 3-28). Over this period, expenditures associated with recreational salmon fishing have generated between $226,000 and $1.4 million of personal income (in 2011 dollars) in Neah Bay each year (Pacific Fisheries Management Council 2012). No directly comparable information is available for local spending associated with the recreational groundfish fishery. Estimates presented in the 2008 Makah Whale Hunt DEIS indicate that spending associated with the recreational groundfish fishery was of a similar magnitude to spending associated with the recreational salmon fishery.

3.6.3.2.6 Contribution of Ocean Commercial Fishing to the Local Economy

High levels of commercial fishing occur throughout the Strait of Juan de Fuca and near the approach to the Strait over Swiftsure Bank. Fish harvested by commercial vessels include five species of salmon, bottom fish, and shellfish (Dungeness crab and pink shrimp). Salmon fisheries, particularly the ocean troll fisheries for Chinook salmon and coho salmon, are managed to safeguard against over-harvest of the least viable individual stocks. Salmon harvest restrictions have severely constrained harvest levels in some years.

In addition to the reservation’s nearshore and river areas, the Makah Tribe’s U&A entirely overlaps the Coast Guard RNA and portions of the OCNMS area to be avoided, and includes the area north of 48° 02’ 15” N (Norwegian Memorial) and west of 123° 42’ 30” W (Tongue Point) and east of 125° 44’ 0” W, all within the United States EEZ. Makah tribal commercial fisheries include 20 different fisheries based on species, gear types, and seasons:

- Mid-water (Pacific whiting, yellowtail rockfish)
- Bottom trawl (cod, flatfish)
- Longline (halibut, black cod/sablefish)
- Ocean troll
  - Summer Strait (Chinook salmon and coho salmon)
  - Winter Strait (Chinook salmon)
- Drift gill net – sockeye salmon, chum salmon, pink salmon
- Set gill net – Chinook salmon
- Dive fisheries (shellfish, sea cucumbers, sea urchin)
- Dungeness crab (ocean and Strait of Juan de Fuca)
- River set net/hook-and-line (salmon)
- Tuna
- Hagfish (in development)

Table 3-28. Sport fishing angler trips by species, 2003 to 2011.

Port Location/Species Group	2003	2004	2005	2006	2007	2008	2009	2010	2011
Neah Bay									
- Salmon	20,400	26,100	18,500	13,400	13,400	6,400	16,500	11,500	11,100
- Groundfish, halibut, and albacore tuna	26,600	18,700	22,400	21,300	20,000	18,500	15,100	16,600	15,400
La Push									
- Salmon	4,400	4,600	4,900	4,100	3,300	2,100	5,100	3,800	4,200
- Groundfish, halibut, and albacore tuna	3,600	2,100	3,000	3,100	3,000	3,300	3,400	4,300	5,300
All ocean port areas north of Cape Falcon, Oregon[1]									
- Salmon	232,600	201,200	159,100	113,900	120,400	73,700	184,900	142,700	137,700
- Groundfish, halibut, and albacore tuna	52,200	40,800	46,400	49,600	45,300	44,300	37,300	39,600	42,400

[1] These data include the ocean port areas of Columbia River and Buoy 10, Westport, La Push, and Neah Bay.

Source: Pacific Fishery Management Council 2012.

Commercial ocean fishing seasons vary according to species, with seasons adjusted from year to year based on fishery management. The non-tribal commercial salmon troll fishery from Cape Falcon (near the Oregon/Washington border) north to the United States/Canada border generally is open from early May until late June for all salmon species except coho salmon. Additionally, during some years, the fishery is open for all salmon species from early July until early or mid-September. For tribal commercial fishing, including the Makah Tribe, salmon fishing is generally open from early May until mid- to late June, and then again from early July until mid-September. Commercial groundfishing is generally open year-round for some species, with seasonal limits imposed on certain species. During the course of any year, periodic openings and closings for specific species may occur during the normal fishing season (Pacific Fishery Management Council 2012).

The tribes are co-managers of the fisheries resources and are involved in management plan development, monitoring, licensing, and enforcement. Based on the Boldt decision (*United States v. State of Washington* 1974), the management plan allocates a portion of the salmon and steelhead among tribal and non-tribal fishers by region of origin. Additionally, the tribes have recognized treaty rights to other species. Since 1986, the tribes have received a direct halibut allocation from the International Pacific Halibut Commission. Since approximately 1994, the Washington State coastal tribes have received an allocation of black cod (sablefish) from the Pacific Fishery Management Council. That tribal allocation of both halibut and black cod subsequently is divided among the tribes by intertribal agreement. Pacific whiting, rockfish, and groundfish tribal harvest allocations are established on a year-to-year basis by the Pacific Fishery Management Council (Makah Fisheries Management 2012). Refer to Subsection 3.1.2.1, Makah Tribal Departments and Agencies, and Subsection 3.1.2.2.2, Makah Fisheries Management Programs, for more information on tribal fisheries management programs.

Commercial fishing is one of the mainstays of the Makah Reservation economy. The Makah Tribe conducts a marine gillnet fishery along the shore near Cape Flattery and in the Strait of Juan de Fuca for Chinook salmon and sockeye salmon. The Makah also participate in a variety of groundfish fisheries. Rockfish, sablefish, Pacific halibut, and whiting are the targeted species and are taken by trawl and longline gear. These fisheries occur year-round, and are centered off the north coast of the Olympic Peninsula.

As of 2011, 188 commercial vessels, all operated by Makah tribal members, were based out of Neah Bay. Tribal employment related to commercial fishing amounts to approximately 515 jobs (Subsection 3.6.3.2.2, Employment).

Commercial landings have varied widely over the last 20 years. Based on data derived from the WDFW commercial catch database, the value of commercial fish landings at the Port of Neah Bay between 2007 and 2011 ranged from \$5.9 to \$9.0 million annually, with the tribal (mainly Makah Tribe) share accounting for 82 to 86 percent of the total landings (Table 3-29). During that period, groundfish made up 56 to 76 percent of the total harvest value of commercial fish landings at Neah Bay (Table 3-29).

The Makah Tribe also participates in the Pacific whiting fishery. Between 2000 and 2010, the allocation to the Tribe ranged from a low of 22,680 metric tons (25,000 tons) in 2002 to a high of 42,000 metric tons (46,297 tons) in 2009 and 2010 (76 Fed. Reg. 18709, April 5, 2011). Whiting prices have varied considerably in recent years, from a record high of \$254 per ton in 2008, to \$119 per ton in 2009 (the sharp decline was presumably due to the worldwide recession) (76 Fed. Reg. 18709, April 5, 2011). This fishery usually opens around the middle of May and closes at the end of December. Most of the whiting caught in the tribal fishery is processed at sea on a processing vessel. Smaller portions of the allocation are delivered to a shoreside processing facility in Westport, Washington. Because virtually no whiting is landed and sold at the port of Neah Bay by tribal or non-tribal fishers, the value of this fishery is not reflected in WDFW's catch database.

Table 3-29. Value of commercial fishing landings by species, 2007 to 2011 (in thousands of nominal dollars).

Landing Location	2007			2008			2009			2010			2011		
	Non-Tribal	Tribal	Total	Non-Tribal	Tribal	Total	Non-Tribal	Tribal	Total	Non-Tribal	Tribal	Total	Non-Tribal	Tribal	Total
Port of Neah Bay															
Groundfish	753	3,622	4,375	614	3,553	4,167	645	3,792	4,438	541	3,764	4,305	680	5,328	6,008
Other	27	87	114	4	18	23	14	97	111	5	47	52	30	36	65
Salmon	144	1,320	1,465	99	1,429	1,528	203	1,092	1,295	489	2,804	3,293	537	2,114	2,651
Shellfish	281	307	589	181	242	423	10	22	32	56	20	76	1	317	318
TOTAL	**1,205**	**5,336**	**6,542**	**899**	**5,242**	**6,141**	**872**	**5,004**	**5,876**	**1,091**	**6,635**	**7,725**	**1,248**	**7,794**	**9,042**
All Washington Ports															
Groundfish	17,519	6,809	24,328	15,971	7,436	23,406	13,091	5,107	18,198	16,740	4,724	21,464	21,301	7,957	29,258
Other	11,513	813	12,326	19,090	830	19,921	18,660	639	19,298	18,554	642	19,195	24,827	528	25,355
Salmon	7,897	13,021	20,918	6,450	15,536	21,986	8,082	12,975	21,057	15,216	25,280	40,496	15,184	23,234	38,418
Shellfish	45,942	31,003	76,945	49,662	34,543	84,205	44,808	37,274	82,083	55,980	42,165	98,145	81,534	55,061	136,594
TOTAL	**82,871**	**51,647**	**134,517**	**91,174**	**58,344**	**149,518**	**84,641**	**55,995**	**140,636**	**106,489**	**72,812**	**179,301**	**142,846**	**86,779**	**229,625**

Note: Totals are subject to rounding.

Source: WDFW 2012b, 2013.

3.6.3.3 Gray Whale Economic Values

3.6.3.3.1 Summary of Economic Effects of the Makah Gray Whale Hunts

No quantitative information is available concerning the economic effects of the Makah Tribe's practice whale hunt exercises in late 1998, or their whale hunting in the spring of 1999 and of 2000, but anecdotal information from media coverage of the hunts on protest and media activity and subsequent tourism-related effects provides some indication of the impacts on the local economy.

As described in more detail in Section 3.13, Transportation, news accounts indicate that protests and media coverage of the practice whale hunt exercises in 1998 and the hunts in 1999 and 2000 temporarily generated an increase in the number of people potentially seeking accommodations and services in the communities of Neah Bay, Clallam Bay, and Sekiu. The change in local economic activity during these periods is, however, difficult to assess based on available information. For example, based on one account (Sullivan 2000), rooms at the Cape Motel and all other motels in Neah Bay were booked by television stations and newspaper staff during the attempted whale hunts in October 1998. In an article published in the *Seattle Times* on October 8, 1998 (Mapes 1998a), however, it was noted that, "One of the biggest surprises of this hunt has been the small turnout of protesters," although the article may have been referring to the demand for accommodations in and near Neah Bay rather than the actual number of protesters near the hunt. According to the article, which noted that protesters were primarily staying in Sekiu, "Campgrounds are empty, and some motels still have vacancies." The same article reported that about 40 media representatives from all over the world were in the Neah Bay area covering the possible whale hunt during October 1998. During the May 1999 whale hunt, which occurred on 4 days of 1 week, the journalists who took up temporary residence on the reservation hired a boat to transport them to the hunting grounds (Sepez 2001). Protesters again arrived in the Neah Bay area during whale hunts in spring 2000 (Oldham 2003). Comparing the spring 1999 and 2000 hunts, the number of protesters decreased from a peak of 50 people during the 1999 whale hunt to a core group of less than 24 people (Welch 2000). Groups of protesters (numbering up to 40 people) staged weekly protests near the Makah Reservation boundary, sometimes temporarily blocking State Route 112, the only paved route to the Makah Reservation, during the 1999 and 2000 hunts (Mapes and Solomon 1999a; U.S. Coast Guard 1999b; Seattle Post-Intelligencer 2000).

In addition to onsite protests, the Makah whale hunts generated calls for boycotts of Makah tribal enterprises and Washington State products by some groups and individuals opposing the hunts. For example, as early as 1997, members of the Sea Shepherd Conservation Society, an opponent of the hunts, reportedly suggested calling for a boycott of tourism on the Olympic peninsula (Westneat 1997). Again, in 1998, it was reported that some activists threatened to organize a boycott of Olympic Peninsula tourism (Simon 1998), although organized boycotts apparently never materialized. In March 1999, an Australian-based animal-rights group called Australians for Animals launched an international boycott of apples produced in Washington State to protest the Makah Tribe's whale hunts, with the group's president claiming that over 1 million people had signed onto the boycott; however, the boycott apparently had no immediate effect on sales of Washington apples (Mapes 1999). Additionally, the Makah Tribe was reportedly listed as the target of a boycott by Co-Op America, an economic action group that teaches individuals how to invest in environmentally responsible ways (Dougan 2001). No information is available to determine whether any of the individual or group calls for boycotts had any effect on Makah tribal enterprises, Olympic Peninsula tourism, or Washington State commerce.

Anecdotal information suggests that any economic effects on tourism may have been minor, as reported in a *Seattle Times* article in August 1999 (Associated Press 1999). Gordon Bentler, the owner of the Cape Motel in Neah Bay, was quoted in the article as saying, "I've noticed no drop. In fact, I think we're probably up this year over last." Also quoted in the article was Rick Hert, executive director of the North Olympic Peninsula Visitor and Convention Bureau, who indicated that room-tax figures from Clallam County hotels and motels appeared relatively flat during the summer of 1999. Last, Bob Buckingham, manager of the marina in Neah Bay, was quoted as saying, "We haven't seen any sign of that [the hunt] affecting us out here. Our actual marina revenue is up from last year so far. We're getting quite a bit of tourism up here." It is unknown whether businesses experienced a decrease in sales because of negative attitudes toward whaling by whale-watchers or other tourists, but it is possible that some businesses were affected.

3.6.3.3.2 <u>Commercial Value of Whales</u>

In the past, whales were valued worldwide as a commercial resource, primarily to satisfy the global demand for whale oil, but also for human and animal foods, fertilizer, leather, and pharmaceuticals (Freeman and Kreuter 1994). Commercial whaling resulted in widespread depletion of many whale species, so governments began to develop regulations and policies to sustain and conserve the whale resource (refer to Subsection 3.4.3.2.2, Protection and Recovery after Commercial Exploitation, for more information about the development of legal protections). Though a moratorium on commercial harvest of gray whales and right whales had been in place since 1937 and was reaffirmed in the 1946 ICRW, commercial harvests of other whale species occurred as late as the 1970s and early 1980s. In December 1971, the United States banned all commercial whaling by United States nationals and sought an international moratorium on the commercial killing of all whales in the IWC arena starting in 1972 (16 USC 916 note, Public Law 96-60, August 15, 1979). As noted in Subsection 3.12, Aesthetics, Congress found that “whales are a unique marine resource of great aesthetic and scientific interest to mankind” and declared that “the protection and conservation of whales are of particular interest to citizens of the United States” (16 USC 916 note, Public Law 96-60, August 15, 1979). Congress also found that “marine mammals have proven themselves to be resources of great international significance, aesthetic and recreational as well as economic” (16 USC 1361(6)). The IWC adopted a 5-year commercial whaling moratorium in 1982, and implemented it in 1986. Some commercial whaling does exist today; Norway and Iceland conduct commercial whaling under an objection to the ICRW’s commercial whaling moratorium (see information about Article V.3 objections in Subsection 1.2.4.1.1, Functions and Operating Procedures of the IWC). Iceland and Japan conduct scientific whaling under Article VIII of the ICRW, but not for gray whales.

More recently, whales have become a commercial resource for the whale-watching industry, a fast-growing tourist activity in several regions of the world (Freeman and Kreuter 1994, O’Connor et al. 2009). In 1994, Kalland reported that participants at a marine mammal conference in 1980 estimated the non-lethal commercial value of cetaceans to be about $100 million dollars, approximately the same value as commercial whaling industries of the day (Kalland 1994). He noted that commercial whaling had largely ceased, and the non-lethal commercial value of whales had increased. About a decade later, Hoyt (2001) reported that whale watching (including vessel-based whale watching and whale-based tourism out of ‘dolphinaria,’ where some places market swimming with whales) was still on the rise. The number of whale watchers worldwide more than doubled between 1991 and 1998, from 4 to 9 million people per year, and the total expenditures increased from $504 million in 1994 to $1 billion in 1998 (Hoyt 2001). By 2008, participation had increased to 13 million people worldwide, generating total expenditures of $2.1 billion (O’Connor et al. 2009). North America is the world’s largest whale watching destination, with over 6.2 million whale watchers in 2008 (O’Connor et al. 2009).

Some people who commented during public scoping expressed their concerns that a gray whale hunt would affect revenues of the local, regional, and west-coast-wide whale-watching industries by causing whales to avoid boats. Although whale watching was not one of the activities included in the Jim Lillstrom and Associates (2003) study (Subsection 3.6.3.1.3, Tourism), it is among the attractions that draws visitors to Clallam County (NOAA 1993; Forks Washington Chamber of Commerce 2013). Much of the whale-watching in Clallam County is done from land-based locations along its seashore. Some operators in Clallam County advertise whale-watching tours (e.g., Island Adventures 2014), and charters may be available through some sport fishing boat operators.

Whale watching primarily occurs during autumn and spring, corresponding with the annual southern and northern migrations of the gray whale. Poor weather conditions often make viewing difficult during the winter southward migration. During the spring northward migration, land-based whale-watching opportunities are good from several locations on the Pacific Ocean coast, including Cape Flattery on the Makah Reservation; Shi Shi Bluffs, south of the Makah Reservation; Cape Alava, near the Ozette Indian Reservation; and at La Push (Great Pacific Recreation & Travel Maps 2000; Bermant 2010).

Outside of Clallam County, whale-watching is an important tourist activity off Westport, located on Washington's Pacific coastline at Grays Harbor, approximately 80 miles (129 km) south of the Makah U&A. Whale-watching trips originating from Westport occur from March to May when gray whales can be viewed just off the coast during their annual migration to northern feeding grounds. Some of Westport's 11 charter boat businesses offer whale-watching trips during this period, along with halibut, bottom fish, salmon, and tuna fishing charter trips at various times throughout the year (WestportWA.com 2015). Whale-watching trips range from $35 to $45 per person and generally last 2.5 hours, with many of the charter operators guaranteeing that clients will see a gray whale during their trip (WestportWA.com 2015). Other locations in Washington advertising whale watch tours/charters (although often focused on killer whales) include: Anacortes, Bellingham, Friday Harbor, Port Townsend, Seattle, and Vashon Island. (GoNorthwest 2014). Along the Oregon coast, the following ports were identified by the Oregon Coast Visitors Association (2014) as offering charter-boat businesses: Brookings, Charleston, Depoe Bay, Garibaldi, and Newport. In California, most whale-watching charters appear to be concentrated from Fort Bragg south, but a few charters advertise gray whale trips out of Eureka and Crescent City (Trekaroo 2014).

Whale-watching is also an important tourist activity off Vancouver Island. On southern Vancouver Island, whale-watching operators are largely based in Victoria, Vancouver Island's largest city, but a few operators are also based in smaller communities, including Port Renfrew, at the mouth of the Strait of Juan de Fuca, and Sidney and Duncan, on Vancouver Island's southeast shore north of Victoria. Whale-watching tours also operate out of Tofino and Ucluelet, located on Vancouver Island's southwest shore (Parks Canada 2013).

Thirteen businesses that offer whale-watching tours or charters operate out of Victoria and nearby communities, including Sidney and Duncan. Several of these operators provide saltwater fishing charters, as well as whale-watching. Tours and charters occur primarily in nearby waters, including the Strait of Juan de Fuca, waters off the San Juan Islands, and waters offshore of the city of Vancouver. The whale-watching tours and charters focus largely on opportunities for viewing killer whales that are part of three resident pods. The high season for whale-watching operators is mid-April through mid-October, when the whales are most visible and the seas are relatively calm. In addition to offering killer whale viewing opportunities, most operators also advertise opportunities for viewing other wildlife, including gray whales, humpback whales, Minke whales, porpoises, seals, sea lions, and otters (BritishColumbia.com 2012; Pacific Whale Watch Association 2014).

On southwest Vancouver Island, 13 businesses offer whale tours operating out of Sooke, Tofino, and Ucluelet (Pacific Whale Watch Association 2014; Tofino-bc.com 2012). Tours out of Tofino generally operate in the waters of Clayoquot Sound, while tours out of Ucluelet generally operate in the waters of Barkley Sound. Some tours also include the waters off the western coast of Vancouver Island; none of the operators describes tours that include the Strait of Juan de Fuca, which is 50 miles (81 km) southeast of Ucluelet. Most tour operators primarily offer opportunities to view gray whales, in addition to opportunities to view killer whales and humpback whales. The tours focusing on migrating gray whales typically are offered in March and April. Tours to see locally feeding gray whales during the summer feeding period are available from April until October or November. In addition to whale-watching trips, several operators in Tofino and Ucluelet offer tours to view other wildlife, including sea lions, seals, sea otters, and birds. Some operators also offer bear-watching tours and fishing charters.

3.7 Environmental Justice

3.7.1 Introduction

The primary issue of concern addressed in this section is the extent to which the proposed action would disproportionately affect minority and low-income populations. United States Census data from 2010 are used to describe existing conditions for population, employment, personal income, and poverty characteristics of minority and low-income populations in Clallam County, with particular focus on tribal communities within the county. Data from the Makah Tribe (J. Johnson, Makah Fisheries Management Data Manager, pers. comm., July 11, 2012) concerning employment, personal income, and poverty supplements the United States Census material. These data form the basis for identifying minority and low-income populations, as well as assessing the relative severity of the proposed action's potential impacts on these communities and economies regarding changes in income, employment, net economic value, and direct and indirect sociological impacts. Unlike Section 3.6, Economics, the information and data provided in this section on Environmental Justice excludes non-native persons residing on reservations. Thus, the data provided in the two sections are not directly comparable.

3.7.2 Regulatory Overview

Executive Order 12898, Environmental Justice, requires that federal agencies "identify and address the . . . disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Based on assessment of the demographic data presented later in this section and preliminary analysis of the type and location of effects potentially resulting from the proposed action, the environmental justice analysis for the proposed action focuses on Clallam County's Native American population.

The EPA Office of Civil Rights and Environmental Justice developed guidance for all federal agencies conducting environmental justice analyses. This environmental justice analysis follows the EPA guidelines. The EPA environmental justice guidelines offer a range of categories to indicate the presence or absence of environmental justice effects (EPA 1998; EPA 2010). Consequently, this indicator-based assessment draws topically from the range of indicator categories EPA (1998) outlined, from information provided in other sections of this environmental impact statement, and from other information relevant to the circumstances of the tribal communities.

3.7.3 Existing Conditions

Existing conditions for the environmental justice analysis are based on information on minority populations in Clallam County. This includes information on demographics, employment, personal income, and poverty characteristics of these populations.

3.7.3.1 Minority Populations

The following subsections provide information on the size and demographic characteristics of minority populations in Clallam County, including Native American populations and the Makah Tribe.

3.7.3.1.1 <u>Clallam County</u>

In 2010, Clallam County's population totaled approximately 71,400 residents, with 40 percent of the population residing in the county's three incorporated areas. The largest of these is Port

Angeles, with 19,000 residents, followed by Sequim (6,600 residents), and Forks (3,500 residents) (United States Census Bureau 2012b).

The population of Clallam County is largely white, with whites accounting for 89.1 percent of the county's residents in 2010 (Table 3-30). American Indians and Alaska Natives (hereafter referred to as Native Americans) are the only other relatively large racial group in the county. The 3,630 Native Americans residing in Clallam County in 2010 accounted for 5.1 percent of the countywide population. Together, all other racial groups accounted for only 8.0 percent of the population. Hispanics, who can be categorized as members of other racial groups for the purposes of the United States Census, accounted for 5.1 percent of the county's population in 2010.

Table 3-30. Racial distribution of Clallam County population in 2010.

Race	Number	Percent (%)
White	62,092	87.0
Native American[1]	3,630	5.1
Asian[1]	1,007	1.4
Black[1]	596	0.8
Native Hawaiian and other Pacific Islander[1]	94	0.1
Some other race[1]	1,269	1.8
Two or more races	2,716	3.8
Total	**71,404**	**100.0**
Hispanic or Latino[2]	3,627	5.1

[1] This includes persons reporting only one race.

[2] For purposes of the United States Census, Hispanics or Latinos may be of any race, so they are already included in other applicable race categories in the table.

Source: United States Census Bureau 2012b

3.7.3.1.2 County Tribal Demographics

Four Native American reservations are located in Clallam County: the Makah Reservation, encompassing Neah Bay; the Jamestown S'Klallam Reservation and off-reservation trust lands at Blyn near Sequim; the Lower Elwha Reservation and off-reservation trust lands west of Port Angeles; and the Quileute Reservation at La Push. Additionally, the Hoh Tribe maintains a business committee office in Forks (in Clallam County), although the Tribe's reservation is located in Jefferson County near the mouth of the Hoh River. The Quinault Tribe, whose reservation is in Grays Harbor County, also has an administrative office in Forks.

Together, the population of Clallam County's four reservations totaled 2,494 persons, including 1,921 persons of Native American ancestry alone, in 2010 (Table 3-31). Non-tribal members also live on reservation properties, including those married to tribal members and those with jobs on the reservation. According to United States Census data, an additional 1,136 Native Americans in Clallam County lived outside of reservation and trust land properties in 2010. Among the four reservations in the county, Native American populations ranged from 5 people on the Jamestown S'Klallam Reservation to 1,066 people on the Makah Reservation.

Table 3-31. Population of American Indian reservations and trust lands in Clallam County in 2010.

Reservation	Total Population	American Indian[2]
Makah	1,414	1,066
Quileute	460	370
Lower Elwha[1]	609	480
Jamestown S'Klallam[1]	11	5
TOTAL	**2,494**	**1,921**

[1] This includes the population on off-reservation trust lands.
[2] This includes Native Americans reporting only one race.
Source: United States Census Bureau 2012c

Table 3-32 presents selected demographics for Native Americans residing on the four reservations in Clallam County. The most notable characteristic of reservation demographics is the youthful nature of their populations. With the exception of the Jamestown S'Klallam Reservation, which had only five Native American residents in 2010, the median age of the Native American populations was well below the median age of 49.0 years for all residents in Clallam County in 2010. The median age of reservation populations ranged from 27.0 years for the Lower Elwha Reservation to 30.0 years for the Quileute Reservation (Table 3-32).

Differences also exist in the average household and family sizes of the reservation populations, which were higher than the countywide averages of 2.22 persons per household and 2.70 persons per family in 2010. Excluding the Jamestown S'Klallam Reservation, average household size ranged from 2.84 on the Makah Reservation to 3.07 on the Lower Elwha Reservation. Average family sizes ranged from 3.28 on the Makah Reservation to 3.54 on the Quileute Reservation (Table 3-32).

Table 3-32. Selected demographics of Native Americans residing on reservation and trust lands in Clallam County in 2010.

Category	Makah Reservation[1]	Quileute Reservation[1]	Lower Elwha Reservation and Trust Lands[1]	Jamestown S'Klallam Reservation and Trust Lands[2]
Male (%)	51.1	53.2	46.3	63.6
Female (%)	48.9	46.8	53.8	36.4
Median age (years)	29.5	30.0	27.0	37.8
Age under 18 years (%)	32.5	32.4	32.7	18.2
Age 65 years and over (%)	8.3	6.2	7.3	9.1
Average household size (persons)	2.84	3.02	3.07	2.75
Average family size (persons)	3.28	3.54	3.37	3.33
Owner-occupied housing units (%)	71.1	51.2	73.2	0.0
Renter-occupied housing units (%)	28.9	48.8	26.8	100.0

[1] Data represent Native Americans reporting only one race. Non-native residents living on reservations are excluded in this state.
[2] Because of the small size of the Native American population residing on the Jamestown S'Klallam Reservation and trust lands, the data represent the entire population of the reservation and trust lands, rather than Native Americans alone.
Source: United States Census Bureau 2012c

3.7.3.1.3 Makah Tribe

The United States Census Bureau (2012c) reported that 1,066 Native Americans lived on the Makah Reservation in 2010, reflecting a slight decrease from the previous census report (1,083 in 2000), but an increase from the number of Native American residents reported in 1990 (940) and 1980 (803). An additional 348 non-tribal persons lived on the reservation in 2010, including those married to tribal members and others who work for government agencies. Not all members of the Makah Tribe live on the Makah Reservation. Tribal enrollment, which includes the total number of tribal enrollees certified as being tribal members by the Tribe's leader or designee, was 2,534 members in 2005 (the most recent year for which data are available) (Indicators Northwest 2012). Data for Native Americans living on the reservation in 2005 are not available, but the number is likely similar to those reported in 2000 (1,083) and 2010 (1,066), suggesting that about 1,500 tribal members lived off the reservation in 2005. Table 3-32 shows selected demographics for American Indians living on the Makah Reservation.

Neah Bay, an isolated fishing and timber community of 865 persons, is the population center of the Makah Reservation, accounting for more than 60 percent of the reservation's population in 2010 (United States Census Bureau 2012c). Most of the Makah residing on the reservation live in Neah Bay, though some live in the reservation's hilly regions and along the road that runs south along the Pacific Ocean side of the reservation (Sullivan 2000).

3.7.3.2 Minority Employment

The subsections below provide information regarding minority employment potentially affected by the Makah's proposed gray whale hunts.

3.7.3.2.1 Clallam County

In 2010, Clallam County's minority civilian labor force totaled 3,417 persons (Table 3-33), representing 11 percent of the county's civilian labor force. Hispanics, who, for the purposes of the United States Census, may be categorized as members of other racial groups, had 1,255 persons in the labor force, accounting for 4 percent of the county's total labor force.

Unemployment for minorities in Clallam County is generally higher than for those in the overall countywide population. In 2010, the estimated unemployment rate for the county's minority population was 12.3 percent, compared to a countywide unemployment rate of 7.2 percent. Hispanics, who can be categorized as members of other racial groups for the purposes of the United States Census, had higher unemployment figures than other minorities, at 13.9 percent.

Table 3-33. Labor force, employment, and unemployment for Clallam County minority and Native American populations in 2010.

	Clallam County		Reservation Lands			
Category	All Minority Persons[1]	Hispanics or Latinos[2]	Makah[3]	Quileute[3]	Lower Elwha[3]	Jamestown S'Klallam[4]
In civilian labor force	3,417	1,255	467	162	143	26
Employed	2,997	1,081	368	146	139	26
Unemployed	420	174	99	16	4	0
Unemployment rate (%)	12.3	13.9	21.2	9.9	2.8	0

[1] This includes Blacks, Native Americans, Asians, Native Hawaiian and other Pacific Islanders, persons of some other race, and persons of two or more races.
[2] For purposes of the United States Census, Hispanics or Latinos may be of any race, so they are already included in other applicable race categories in the table.
[3] Data represent Native Americans on reservations reporting only one race. Non-native residents on reservations are excluded from this table.
[4] Because of the small size of the Native American population residing on the Jamestown S'Klallam Reservation and trust lands, the data represent the entire population of the reservation and trust lands, rather than Native Americans alone.
Source: United States Census Bureau 2012c

3.7.3.2.2 County Tribal Employment

Native Americans residing on the reservations of Clallam County's four tribes had a labor force of 798 persons in 2010, with 679 of these persons employed (Table 3-33). About 60 percent of the tribal labor force resided on the Makah Reservation, with virtually all of the remaining tribal labor force living on the Quileute and Lower Elwha Reservations. Together, Native Americans on the four reservations had an unemployment rate of 15.1 percent in 2010, higher than the 7.2 percent rate countywide and the 12.3 percent rate for all minority groups combined in Clallam

County. The difference in unemployment rates between Native Americans and the general population in the county may be higher than that reported by the United States Census, because some tribal members may have been available for work, but dropped out of the labor force because of the lack of nearby employment opportunities.

Government employment is important to Native Americans living on the county's four reservations (Table 3-34). Two industrial sectors linked to government (the public administration sector and the educational, health, and social services sector), generated more than half of all jobs for reservation tribal members in 2010, including 59 percent of the jobs for the Makah Reservation, 55 percent of the jobs for the Quileute Reservation, and 42 percent of the jobs for the Lower Elwha Reservation. Industries related to agriculture, forestry, fishing, hunting, and mining are also important to the reservations, accounting for 19 percent of all job opportunities in 2010 (Table 3-34).

3.7.3.2.3 Makah Tribe

In 2010, the labor force of Native Americans (primarily Makah and excluding non-native residents) on the Makah Reservation totaled 467 persons, representing 62 percent of the Native American population 16 years old or older (United States Census Bureau 2012c). This labor force participation rate was about the same as the rate in 1990 and 1980 (United States Census Bureau in Northwest Area Foundation 2005).

As Table 3-33 shows, 368 Native Americans on the Makah Reservation had jobs in 2010. The census data indicate that 21.2 percent of the tribal labor force was unemployed that year, an unemployment rate substantially higher than the 7.2 percent rate countywide. While relatively high, the tribal unemployment rate suggested by the census data is much lower than the 70 percent and 54 percent unemployment rates reported by the Makah Tribe and the Bureau of Indian Affairs as recently as 2001 and 2003, respectively (Bureau of Indian Affairs 2001; 2003).

Table 3-34. Employment by industry of Native American residents in Clallam County in 2010.

	Makah Reservation[1]		**Quileute Reservation[1]**		**Lower Elwha Reservation[1]**		**Jamestown S'Klallam Reservation[2]**	
Industry	**Number**	**Percent (%)**	**Number**	**Percent (%)**	**Number**	**Percent (%)**	**Number**	**Percent (%)**
Agriculture, forestry, fishing, hunting, and mining	74	20.1	42	28.8	10	7.2	0	0.0
Construction	0	0.0	0	0.0	19	13.7	3	20.0
Manufacturing	8	2.2	0	0.0	0	0.0	0	0.0
Wholesale trade	0	0.0	0	0.0	0	0.0	0	0.0
Retail trade	8	2.2	2	1.4	15	10.8	0	0.0
Transportation, warehousing, and utilities	0	0.0	0	0.0	1	0.7	1	6.7
Information	0	0.0	0	0.0	10	7.2	0	0.0
Finance, insurance, real estate, and rental and leasing	27	7.3	0	0.0	0	0.0	0	0.0
Professional, scientific, management, administrative, and waste management services	16	4.3	6	4.1	0	0.0	2	13.3
Educational, health, and social services	108	29.3	65	44.5	5	3.6	0	0.0
Arts, entertainment, recreation, accommodation, and food services	19	5.2	12	8.2	25	18.0	2	13.3
Other services (except public administration)	0	0.0	3	2.1	0	0.0	3	20.0
Public administration	108	29.3	16	11.0	54	38.8	4	26.7
TOTAL	**368**	**100.0**	**146**	**100.0**	**139**	**100.0**	**15**	**100.0**

[1] Data represent Native Americans on reservations reporting only one race. Non-native residents on reservations are excluded from this table.

[2] Because of the small size of the Native American population residing on the Jamestown S'Klallam Reservation and trust lands, the data represent the entire population of the reservation and trust lands, rather than Native Americans alone.

Source: United States Census Bureau 2012a

Because of the seasonal nature of the reservation's tourist and fishing industries, unemployment is generally much higher during winter months than during the summer (Sullivan 2000).

According to the 2006-2010 American Community Survey estimates, three industrial sectors of the local economy provided more than three-quarters of the jobs held by tribal members in 2010. As discussed previously, two sectors associated with government activity (the public administration sector and the educational, health, and social services sector) together generated more than half of the employment opportunities for reservation tribal members (Table 3-34). Additionally, the industrial sector most closely related to the area's natural resources (the agriculture, forestry, fishing, hunting, and mining sector) provided 20 percent of the jobs held by

Native Americans on the reservation. Note that the survey, which estimated 74 jobs in this sector, may have underestimated the fishing-related employment in this sector. As noted in Subsection 3.6.3.2.2, Employment, commercial vessels owned and operated by Makah tribal members generated approximately 515 jobs in 2011; because only Makah tribal members may participate in the Tribe's treaty fisheries, these jobs were only held by tribal members. This fisheries-related employment is seasonal in nature.

3.7.3.3 Personal Income and Poverty Levels

The subsections below provide information on personal income and poverty levels in Clallam County.

3.7.3.3.1 Clallam County

The income of minority populations in Clallam County is generally lower than that of the countywide population. According to the 2006-2010 American Community Survey estimates, the median household income (household income includes the income of all persons considered part of an individual household) for the overall population in Clallam County was $44,398 in 2010. The median household income was lower for all minority populations for which county-level data were available (Table 3-35). For Native Americans, the county's largest minority group, the median household income was approximately 37 percent lower than it was countywide. For Hispanics, the next-largest group, the median household income was approximately 28 percent lower than it was countywide (Table 3-35). County-level data were not available for two minority populations, Blacks and Pacific Islanders, because the sample size was too small (United States Census Bureau 2012a). Data that were presented in the 2008 Makah Whale Hunt DEIS indicate that the 1999 median household incomes for these populations were within approximately 10 percent of the countywide median value. It is not possible to determine whether this pattern continued to hold true in 2010. Comparable data at the state level indicate that the median household income for Blacks in 2010 was 29 percent lower than the statewide median, while the corresponding value for Pacific Islanders was only 2 percent lower than the statewide median (United States Census Bureau 2012a).

The income differences between Clallam County's minority populations and its countywide population were even greater on a per capita income basis (per capita income is the total income of an area or population averaged across all persons within an area or population). In 2010, per capita incomes of minority populations for which county data are available ranged from $12,080 (for Hispanics) to $19,718 (for Asians), compared to per capita income of $24,449 for the countywide population (Table 3-35). For Native Americans and Hispanics, per capita income levels were 48 percent and 51 percent lower, respectively, than the countywide per capita income.

Similar to median household income, 2010 county-level per capita income data for Blacks and Pacific Islanders are unavailable because the sample size was too small (United States Census Bureau 2012a). Data that were presented in the 2008 Makah Whale Hunt DEIS indicate that the 1999 per capita income for Blacks was approximately 29 percent lower than the countywide per capita income, and the corresponding value for Pacific Islanders was 55 percent lower than the countywide per capita income. It is not possible to determine whether this pattern continued to hold true in 2010. Comparable data at the state level indicate that the per capita income for Blacks in 2010 was 28 percent lower than the statewide value, while the per capita income for Pacific Islanders was 36 percent lower than the statewide value (United States Census Bureau 2012c).

Table 3-35. Income and poverty status of minority populations in Clallam County in 2010.

Racial Category	Median Household Income ($)	Per Capita Income ($)	Individuals Below Poverty Level
			Percent
Native American[1]	27,917	12,677	37.9
Asian[1]	33,750	19,718	8.0
Black[1,2]	NA	NA	NA
Native Hawaiian and other Pacific Islanders[1,2]	NA	NA	NA
Some other race[1]	19,130	12,117	44.7
Two or more races	36,833	13,026	25.6
Hispanic or Latino[3]	32,122	12,080	26.3

NA = not applicable.
[1] This includes persons reporting only one race.
[2] Because of small sample sizes, county-level data were not available for Blacks and Pacific Islanders.
3 For purposes of the United States Census, Hispanics or Latinos may be of any race, so they may already be included in other applicable race categories in this table.
Source: United States Census Bureau 2012c

With the exception of the Asian population, the poverty rates (the poverty rate is the percentage of families or individuals living below the poverty thresholds established each year by the United States Office of Management and Budget) of all minority populations for which county-level data were available in Clallam County exceeded the countywide rate of 14.3 percent in 2010. The highest poverty rates occurred in the Native American population (37.9 percent) and among persons belonging to non-specified races (44.7 percent) (Table 3-35). As with income data, 2010 county-level poverty rates for Blacks and Pacific Islanders are unavailable because the sample size was too small (United States Census Bureau 2012c). Data that were presented in the 2008 Makah Whale Hunt DEIS indicate that the 1999 poverty rate for Blacks was approximately 1.7 times higher than the countywide rate, and the corresponding value for Pacific Islanders was more than 3.7 times higher than the countywide rate. It is not possible to determine whether this pattern continued to hold true in 2010. Comparable data at the state level indicate that the poverty rate for Blacks in 2010 was twice the statewide value, while the rate for Pacific Islanders was approximately 1.5 times the statewide value (United States Census Bureau 2012c).

3.7.3.3.2 County Tribal Income

As discussed in Subsection 3.7.3.3, Personal Income and Poverty Levels, median household income and per capita income were lower for the Native American population in Clallam County than for the general countywide population in 2010. Additionally, the poverty rate for all Native Americans residing in Clallam County, at 37.9 percent in 2010, was higher than the countywide rate of 14.3 percent (Table 3-36).

For those Native Americans living on Clallam County's four tribal reservations, median household and family income were much lower than countywide income levels in 2010. Median household income for Native Americans living on reservations was 28 to 62 percent lower than the county's $44,398 median household income (Table 3-36). Similarly, median family income for reservation families was 42 percent to 54 percent lower than the countywide median family income of $54,837.

Table 3-36. Income and poverty status of Native American residents on reservations in Clallam County in 2010.

Category	Makah Reservation[1]	Quileute Reservation[1]	Lower Elwha Reservation and Trust Lands[1]	Jamestown S'Klallam Reservation and Trust Lands[2]
Median household income ($)	32,155	34,107	17,083	75,625
Median family income ($)	31,597	30,833	25,385	75,625
Per capita income ($)	13,105	12,866	10,555	21,579
Percent of families below poverty level (%)	23.5%	31.7%	55.6%	0.0%
Percent of individuals below poverty level (%)	31.8%	28.6%	59.5%	0.0%

[1] Data represents Native Americans reporting only one race. Non-native residents at reservations are excluded from this table.
[2] Because of the small size of the Native American population residing on the Jamestown S'Klallam Reservation and trust lands, the data represent the entire population of the reservation and trust lands rather than Native Americans alone.
Source: United States Census Bureau 2012c

A larger disparity between tribal and countywide income exists for per capita income. In 2010, estimated per capita income for tribal reservation members ranged from $10,555 for the Lower Elwha Reservation to $13,105 for the Makah Reservation (Table 3-36). These income levels are approximately half the $24,449 per capita income for the countywide population in 2010. Census income and poverty statistics for the Jamestown S'Klallam Reservation are not discussed in this subsection, although they are presented in Table 3-36, because of the small number of persons residing on the reservation.

Given the disparity in incomes, poverty rates for tribal reservation families and individuals are substantially higher than for the general countywide population. In 2010, the percentage of tribal reservation families with incomes below the federal poverty threshold ranged from 23.5 percent to 55.6 percent, compared to 9.5 percent of families countywide (Table 3-36). For tribal individuals, poverty rates ranged from 28.6 to 59.5 percent, much higher than the countywide poverty rate of 14.3 percent.

3.7.3.3.3 Makah Tribe

Native Americans living on the Makah Reservation have substantially lower incomes and experience higher poverty rates than residents throughout Clallam County. According to the United States Census Bureau, the median household income of Native Americans on the Makah Reservation was $32,155 in 2010 (Table 3-36), 28 percent lower than the countywide median household income. Relative to all reservations in the United States, the median income of tribal households on the Makah Reservation has been falling over the past three decades. In 1979, the median household income of American Indians on the Makah Reservation was 48 percent higher than the median household income of all United States reservations. By 2010, this was no longer the case: the median household income of Native Americans on the Makah Reservation was approximately 13 percent lower than the median household income of Native Americans and Alaska Natives nationwide (U.S. Census Bureau 2012c).

Similar to household income, the per capita income of Makah Reservation tribal members is lower than per capita income countywide, registering 54 percent of the countywide level in 2010. The disparity in income levels explains the relatively high poverty rates for Native Americans residing on the Makah Reservation. In 2010, 23.5 percent of the Native American families residing on the Makah Reservation fell below the federal poverty level compared to 9.5 percent of all families in Clallam County (Table 3-36). Poverty figures for individuals were similar to those for families, with 31.8 percent of the Makah Reservation's tribal members living below the poverty level compared to 14.3 percent of all individuals in Clallam County. During the 2009 to 2010 school year, 62 percent of the students in the Cape Flattery School District qualified for free or reduced lunch programs, based on family incomes below the federal poverty threshold (Office of Superintendent of Public Instruction 2011). The comparable value statewide was 42 percent. Approximately 70 percent of the students in the school district (which includes schools in Neah

Bay and Clallam Bay) are identified as American Indian or Alaskan Native, compared to 2.5 percent statewide. As another indicator of the level of need in the community, approximately 114 households on the reservation rely on food banks and federal food programs to feed their families (Renker 2012).

3.7.3.4 Outreach to Minority and Low-Income Populations

Outreach to minority and low-income populations was part of the overall scoping process NMFS conducted for the Makah Whale Hunt EIS. Subsection 1.5.1, Scoping Process, of this EIS contains a description of the scoping process, as does the scoping report associated with this EIS.

3.8 Social Environment

3.8.1 Introduction

This section discusses the social environment, including the apparent emotions and attitudes of people and communities potentially affected by the Makah whale hunt. The range of emotions and attitudes, as well as the resulting tensions, are described below in the context of the various groups that have expressed an interest in the hunt. The information in this section primarily comes from the period prior to release of the 2008 DEIS, as no Makah hunt has been authorized during the intervening period and there has been no unauthorized hunting.

3.8.2 Regulatory Overview

No specific regulations directly address social tensions in the project area. However, the Coast Guard has established a RNA that allows it to enforce vessel activities (including protesters' vessels) near any Makah whale hunt and reduce the danger of loss of life and property (Subsection 3.1.1.3, Coast Guard Regulated Navigation Area).

3.8.3 Existing Conditions

3.8.3.1 Makah Tribal Members

The Makah Tribe values whales for their ceremonial and subsistence uses, including the spiritual role they play in Makah culture. According to the Application for a Waiver of the Marine Mammal Protection Act Take Moratorium to Exercise Gray Whale Hunting Rights Secured in the Treaty of Neah Bay, the Makah Tribe has attempted to revive its cultural traditions for the past three decades (Makah Tribe 2005). The Tribe believes it must revive these traditions to combat the social disruption resulting from the rapid changes of the last century and a half. The document states that rates of teenage pregnancy, high-school dropout, substance abuse, and juvenile crime indicate that the Makah community is still in flux and that the enormous social disruption caused by epidemics, boarding schools, and federal acculturation policy still exists. To reverse these trends, the Makah have reinstituted numerous song, dance, and artistic traditions. The Tribe currently operates a program to restore the Makah language to spoken proficiency on the reservation. Given the centrality of whaling to the Tribe's culture, the Makah Tribe believes that a revival of subsistence whaling is necessary to pursue its spiritual renaissance (Makah Tribe 2005).

In preparation for the 1999 whale hunt, tribal participants engaged in both spiritual and physical training for the hunt. Overall, Makah tribal members experienced an increase in tribal pride (Bowechop 2004). This revival of Makah whaling rituals and traditional knowledge occurred after a 70-year hiatus (Section 3.10, Ceremonial and Subsistence Resources). Hunters reported that the activities accompanying the hunt strengthened tribal member identity as descendants of Makah whalers (Tweedie 2002). One of the elders who grew up speaking Makah reported that Makah language class attendance swelled after the hunt (Oldham 2003). Many community members were present when the first whale was landed at Neah Bay in 1999, and 80 percent attended the tribal celebration of the first whale hunt (Makah Tribe 2005). Most Makah felt that the restoration of whaling had improved social and cultural conditions on the reservation. Subsistence whaling, both in the historic and contemporary contexts of the Makah culture, is further discussed in Subsection 3.10.3.4, Makah Historic Whaling, and Subsection 3.10.3.5, Contemporary Makah Society, respectively.

Although most Makah tribal members support the hunt, some do not. According to a 2001/2002 household whaling survey the Makah Tribe conducted, 93 percent responded that the Makah Tribe should continue to hunt whales, 6 percent responded that the Tribe should not hunt whales, and 1 percent was undecided (Renker 2002; 2007). This and subsequent surveys are described further in Section 3.10, Ceremonial and Subsistence Resources. One Makah tribal member has publicly opposed the hunt, and spoke at the 1996 annual IWC meeting. She reported encountering harassment and hostility from pro-whaling tribal members (Mapes 1998b). According to a newspaper account, other members who did not approve of the hunt were less vocal about their dissent (Mapes 1998c). The article indicated that those who spoke out were criticized for disloyalty to their leaders and for exposing tribal dissention to the outside world. According to Keith Hunter, a Neah Bay resident who is not a Makah tribal member, there has been no opposition to whaling of the sort portrayed by many of the anti-whaling advocates (CERTAIN 2000). Hunter claimed that disagreements, concerns, or differences almost entirely healed, and those remaining disappeared on the day the Makah took the whale.

Many people beyond the reservation do not support whaling, and protests were common during the hunting periods (Subsection 1.4.2, Summary of Recent Makah Whaling – 1998 through 2007, and Subsection 3.15.3.4, Behavior of People Associated with the Hunt). Makah tribal members have expressed frustration with protesters and others who oppose the whale hunt. They believe that protesters, like missionaries and government Indian agents preceding them, are pushing their cultural values on the Makah people and telling them how and how not to be Makah (Johnson 1999).

The Makah Tribal Council provided financial support to both the whaling captain and whaling crew as they were training for the hunts in 1998 and hunting in 1999 and 2000. In 2002, the Council decided not to provide financial support, leaving it up to whaling families to support any hunts, consistent with tribal tradition. In 2002, at least three families were interested in a hunt, and two were actively training (Mapes 2002). The Makah Tribal Council has not indicated whether it would financially support future hunts if they were authorized. In the years since the 2008 DEIS was released and those involved in the unauthorized hunt were prosecuted, the Makah Tribe has continued to demonstrate its desire for a whale hunt; for example, by renewing its requests at the IWC and continuing to ask NMFS to complete its consideration of the waiver request.

3.8.3.2 Other Tribes

Many other tribes supported, and continue to support, the Makah's right to hunt whales, in part because they want the federal government to uphold treaty rights. In 1999, the *Peninsula Daily News* reported that thousands of Native Americans from Canada to New Mexico anticipated journeying to Neah Bay for a feast to celebrate the successful hunt (*Peninsula Daily News*, the *Associated Press*, and *Seattle Times* 1999). The hunt was supported by the Northwest Indian Fisheries Commission, an organization of 20 member tribes in western Washington, and the president of the Northwest Indian Fisheries Commission gave a speech at the celebratory feast after the whale was killed (Bowechop 2004). In 2003, the Affiliated Tribes of Northwest Indians passed Resolution 03-13 in support of the Makah whaling treaty rights. In 2004, the National Congress of American Indians passed Resolution MOH-04-025, stating the following:

> . . . go on the record in full support of the right of the Makah to freely exercise their treaty right to hunt whales while supporting the rights of Fishing Tribes to marine mammal management without threats, intimidation, harassment, or interference.

The National Congress of American Indians also expressed support for the Makah after the *Anderson v. Evans* (2004) decision. It called upon the United States government and all of its agencies to "support the efforts of the Makah Tribe and affected tribes to restore its full treaty whaling rights." In a 2005 scoping letter on the DEIS, Honor Our Neighbor's Origins and Rights registered its support of the treaty-protected right of the Makah to pursue whaling. A Puyallup

Tribe member supported this idea in an interview with the *Seattle Times* by noting the importance of Makah whaling in the context of tribal rights. He mentioned the importance of solidarity, saying "One of the ways we were conquered was by dividing us" (Hamilton 1999a). Some individual Native American commenters for this DEIS did express opposition to the hunt; a summary of the views of these and other individuals is encapsulated below in Subsection 3.8.3.3, Other Individuals and Organizations.

Immediately after the successful 1999 whale hunt, anti-whaling activists targeted the Muckleshoot, Puyallup, and Tulalip Tribes for their support of the Makah's whale hunt (Burkitt 1999a). The tribes received verbal threats and insults, including a bomb threat to a tribal school (Burkitt 1999a).

3.8.3.3 Other Individuals and Organizations

This section covers the range of attitudes about Makah whale hunting held by Clallam County residents, Washington State residents, United States residents, foreign nationals, and people affiliated with organizations. Both local and out-of-state residents have expressed support for and opposition to the Makah whale hunt. This section also covers the attitudes of potential tourists who may or may not choose to visit the area because of their perceptions of the whale hunt.

Although the debate can often be characterized as polar extremes of whaling proponents and whaling opponents, the complicated views cannot be reduced to two simple perspectives (Sepez 2002). Some people believe, for instance, that all whaling, including commercial whaling, is acceptable as long as the whale resource remains at a sustainable level based on scientific, principled management. Some people believe that commercial whaling is unacceptable, but that subsistence whaling for aboriginal cultures is acceptable. Some people believe that whaling for any purpose is unacceptable and should not be allowed. The debate about how to manage whales involves culturally based values (Freeman 1994).

Specific to the Makah's past and proposed whale hunting activities, we received public comments on the 1997 EA, the 2001 EA, and the 2008 DEIS. The commenters are not necessarily divided along cultural lines (people from indigenous cultures versus people from western societies). Some Native American commenters and individual Makah tribal members interviewed in the past disagree with the hunt. Some commenters who did not identify themselves as Native Americans support the hunt. Commenters who have supported or would support the Makah hunt give many reasons for their support, including, but not limited to, their perception of the established treaty whaling right of the Makah Tribe and federal obligations to the Makah Tribe (Subsection 1.2.2, Treaty of Neah Bay and the Federal Trust Responsibility); the relative health of the gray whale population (Subsection 3.4.3.4, Current Status of the Gray Whale Population); and the historical and contemporary cultural meaning ascribed to whaling by the Makah (Section 3.10, Ceremonial and Subsistence Resources).

Commenters who did not or would not support the Makah's hunt of gray whales also gave a multitude of reasons, some of them related to social and economic values attributed to the gray whales. Several people, for instance, commented on the beauty of the whales and the emotions they inspire. Many people oppose the killing of whales because they believe whales are intelligent (comparable in this regard to humans) and have sophisticated forms of community and communication. One review states, "stranger than fiction is fact that there already exists a species of animal life on earth that scientists speculate has higher than human intelligence. The whale has a brain that in some instances is six times bigger than the human brain and its neocortex is more convoluted" (D'Amato and Chopra 1991). In a letter to the *Seattle Post-Intelligencer* editor, one person wrote ". . . I believe whales and other marine mammals are intelligent, and for lack of opposable thumbs, might be creatures equal to humans on the evolutionary ladder" (*Seattle Post-Intelligencer* 1999). In addition, human-like characteristics of whales, such as humpback whales' complicated communication system and the strong family grouping of orcas, particularly endear whales to people (Sepez 2002). Some people also believe that whales are sentient beings that should be allowed to exist free from human harm.

People both inside and outside of the United States have said that they value the existence of gray whales in the project area as fellow mammals, and they want to know that whales exist unmolested. Many people (mostly local residents) who watch whales in the analysis area on a regular basis attach existence values to individual PCFG whales who regularly visit the area. Many people were also concerned about the pain individual whales experience if struck or killed in a hunt. Some people believe that cruelty is unavoidable in methods for a whale hunt (Freeman 1994).

After the 1999 hunt, many people expressed remorse and anger about the whale hunt in protests in Seattle and Port Angeles in letters and calls to local and regional newspapers such as the *Peninsula Daily News*, the *Seattle Times*, and the *Seattle Post-Intelligencer*. The *Seattle Times* reported that they received almost 400 phone calls and emails running about 10-to-1 against the hunt within hours of the Makah Tribe's successful kill of a gray whale (*Seattle Times* staff 1999). Many people's comments were reactions to the images of the killing of the whale on the morning television news. Some thought the coverage of the killing was inappropriate for television news

(Levesque 1999). Some protesters and comment writers expressed violent feelings and displayed racism towards the Makah.

Some comments on the 2008 DEIS suggested that people would boycott products and not participate in tourism on the peninsula and throughout the state as a result of whaling. They were concerned that whaling would cause economic impacts on hotels, restaurants, stores, and tourist-related businesses. Some people opposed using modern technology for the hunt, suggesting that a traditional hunt should be conducted using traditional technology (Subsection 2.4.5.1, Hunt Using Only Traditional Methods). Although most letters and calls received by newspapers after the successful 1999 whale hunt opposed the whale hunt, many commenters expressed support for the Tribe and the hunt. One letter said, "It is the right of the Makah to keep their culture alive and if whale hunting is part of it, so be it!" (*Peninsula Daily News* 1999). Some comments on the 2008 DEIS also expressed support for the hunt, remarking on tourist interest in whaling, cultural diversity, and the importance of upholding treaty rights. One comment received during scoping for the 2008 DEIS indicated that the Pacific Northwest embraces all cultures and practices and that people come to the area because of this diversity.

Organizations that oppose whaling in general include animal-rights and marine conservation organizations, the whale-watching industry, and anti-treaty constituents. Some of these groups are opposed to the Makah whale hunt, while others think that aboriginal whaling is an acceptable form of whaling if conducted in a sustainable manner. More than 350 groups from 27 countries have expressed opposition to the Tribe's whale hunt (Oldham 2003).

In the 1970s, the popular Save the Whales conservation movement began, with the objective of preventing the extinction of whale species (Sepez 2002). Information about whales and whaling was advertised by media releases, films, television programs, aquarium shows, videos, books, magazines, paintings, and whale-watching businesses, among other things (Barstow 1996; Sepez 2002). Over time, stemming from the unsustainable commercial whaling practices in the past, an ideological debate has emerged concerning the appropriateness of any whale hunting (Freeman 1994; Stoett 1997). Whales have become symbolic of the need to protect the natural environment, at least in western societies (Barstow 1996; Stoett 1997).

In 2002, after the IWC renewed the gray whale catch limits in response to the joint request from Russia and the United States, some anti-whaling groups announced they would not obstruct the Makah hunt directly (Watson 2002), and one group expressed concern that opposition to the hunt might be misinterpreted as opposition to treaty rights (Mapes 2002). Most whale-watching tour operators are opposed to whale hunting primarily for economic reasons. Some scoping comments expressed concerns that a gray whale hunt would affect local and regional whale-watching industry revenues by causing whales to avoid boats. The West Coast Anti-Whaling Society, made up of professional whale-watching tour guides, is one group that has opposed Makah whaling (Hamilton 1999b). More information on the whale-watching industry is available in Subsection 3.6.3.2.4, Contribution of Tourism to the Local Economy.

While Clallam County residents have expressed the range of attitudes about Makah whale hunting described above, a more intense debate about the issue seems to be occurring in and near Clallam County because of proximity to Neah Bay. This intense debate, which includes strong disapproval of and support for the hunt, is evident in the many interactions with Clallam County residents, including scoping letters for the 2008 DEIS; verbal scoping comments recorded at the Port Angeles DEIS scoping meeting; letters and calls from Clallam County residents received after the successful 1999 whale hunt; written and verbal comments on the 2008 DEIS; and whaling protests in Port Angeles. Of those Clallam County residents who expressed a view during scoping and on the 2008 DEIS, more expressed disapproval of the hunt than those expressing support for the hunt.

A local group called Peninsula Citizens for the Protection of Whales actively opposes the hunt. The group's 2006 scoping letter and comments on the 2008 DEIS expressed fear that continued whaling will divide the community, and the many tribes in the area will be drawn into the controversy. Members of the group protested near the Makah reservation border in the spring of 1999 (Porterfield 1999). Another local group, Washington Citizens Coastal Alliance, based in nearby Friday Harbor, sent out a travel advisory to several hundred travel organizations, media groups, and individuals, expressing opposition to whaling (Hamilton 1999b). The advisory warned potential tourists to Neah Bay of recent conflicts and violence stemming from the whaling issue. The *Seattle Times* reported that other activists have said that the controversy was ripping apart rural Clallam County and Washington as a whole (Welch 2001).

Several incidents involving violent or near-violent confrontations between whaling opponents and Tribe members have occurred in Clallam County since the Tribe first announced its intention to hunt whales in 1995. It is difficult to determine which protesters are local residents and which are representatives of anti-whaling organizations based outside the area. An anti-whaling activist meeting in Port Angeles in 1998 was the scene of a near-riot when Makah tribal members arrived to support whaling (Peterson 2000). One incident in 1999 involved two animal-rights activists tossing ignited smoke canisters at a tribal motorized support boat and throwing an ignited flare into the water near the boat (Porterfield 1999). Another incident involved a protest boat being pelted with rocks and bottle rockets after a group of protest boats converged inside the Neah Bay Marina (Gottlieb 1999). One man burned the American flag and some tires in a Port Angeles park in protest of the whale hunt (Gottlieb 1999). During and after the successful 1999 whale hunt, Tribe members and the Coast Guard received emails and phone calls with death threats and anti-whaling messages (Hamilton 1999c). Some Tribe members have been refused service at businesses in Port Angeles (Hamilton 1999c). Refer to Subsection 1.4.2, Summary of Recent Makah Whaling – 1998 through 2007, and Subsection 3.15.3.4, Behavior of People Associated with the Hunt, for a more complete description of protest activities.

Other evidence of heightened local tensions can be found in a 2001 letter from the Port Angeles Chief of Police and Clallam County Sheriff to NMFS, asking NMFS not to hold public hearings on the whaling issue in Port Angeles for the 2001 EA. The request was made because of concerns that violent demonstrations would overwhelm the resources of local law enforcement (Port Angeles Police Department 2001).

3.9 Cultural Resources

3.9.1 Introduction

The following section discusses the cultural resources in the project area that may be affected by the proposed action.

3.9.2 Regulatory Overview

Federal and state laws protect and preserve cultural resources. The United States' first preservation law, the Antiquities Act of 1906, was updated and expanded in 1966 when Congress enacted the National Historic Preservation Act, declaring that "the historical and cultural foundations of the Nation should be preserved as a living part of our community life and development in order to give a sense of orientation to the American people." Thus, the National Historic Preservation Act established a national historic preservation program that has operated as a decentralized partnership between the federal government and the states. The National Historic Preservation Act, amended in 1980 and again in 1992 (16 USC 470 *et seq.*), identified a leadership role for the federal government in historic preservation. Through a partnership with the states, in addition to relationships with Indian tribes, local governments, and private organizations, the National Historic Preservation Act fosters conditions "under which our modern society and our prehistoric and historic resources can exist in productive harmony." These relationships provide broad participation in national historic preservation programs, while maintaining standards consistent with the National Historic Preservation Act and the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* (48 Fed. Reg. 44716, September 29, 1983).

Federal agency requirements to consult with Indian tribes are clarified in the Advisory Council on Historic Preservation's regulations, Protection of Historic Properties (36 CFR Part 800), implementing section 106 of the National Historic Preservation Act. These regulations emphasize participation in this process by state historic preservation officers and the public, including Native American groups. Where the pertinent tribe has taken over all or some functions of the state historic preservation officers, as the Makah Tribe has done, the federal agency must consult with the tribal historic preservation officer for projects occurring on Indian reservations or potentially affecting a tribe's off-reservation traditional cultural properties.

Archaeological resources on federal lands received federal protection under the 1979 Archaeological Resources Protection Act and the 1990 Native American Graves Protection and Repatriation Act. Federal law applies to all federal and Native American lands, and Washington State law applies to all other lands within the project area. Washington State Executive Order 05-05 provides for the Department of Archaeology and Historic Preservation to review certain projects not undergoing section 106 review to determine potential impacts to cultural resources. With respect to cultural resources within the Makah Tribe's traditional territory, the Tribe takes an active role in the documentation and preservation of these resources, including the assessment of potential impacts to its cultural resources.

3.9.3 Existing Conditions

3.9.3.1 National Historical Register Sites

There are two historic sites listed on the National Register of Historic Places near the project area where a whale could be landed (i.e., the Makah U&A waters and shoreline). The first is Tatoosh Island, which was a summer home to the Makah Tribe. The Makah landed whales on Tatoosh Island. A lighthouse was erected there in 1857. The second listed site is Wedding Rock Petroglyphs, located on the beach between the Ozette and Sand Point Trails in the coastal strip of the Olympic National Park (i.e., Ozette Triangle). The Wedding Rock Petroglyphs are located in the rocks about the high tide line, and they attract many visitors each year.

3.9.3.2 Archaeological Sites

Around 1750, a substantial section of the Ozette village on the outer coast of the Olympic Peninsula was encased in a spring mudslide. This anaerobic environment preserved wood, bone, textile, and cordage to create unprecedented archaeological preservation. More than a decade of archaeological excavations at this site, beginning around 1970, yielded 55,000 artifacts, 12,000 structural remains, and more than 1 million faunal remains. These archaeological investigations revealed about 2000 years of human occupation along the Olympic Peninsula in the Late Period of the Northwest Coast (Wessen 1981).

3.9.3.3 Other Culturally Important Sites

Of particular assistance in determining the presence and location of traditional cultural properties was the “Makah Traditional Cultural Property Study,” prepared for the Office of Archaeology and Historic Preservation, State of Washington, Olympia, in cooperation with the Makah Cultural and Research Center, Neah Bay (Renker and Pascua 1989). That study recognized the entire Makah traditional territory as a traditional cultural property. For the purposes of the EIS, however, the definition of a traditional cultural property was narrowed to include only those sites known to be directly associated with whaling for which the location has been reported. Makah elders identified First Beach, situated immediately adjacent to Neah Bay, as a site associated with butchering whales. A review of the ethnographic literature did not locate other sites that would meet the criterion of a traditional cultural property for this EIS.

First Beach, situated next to Neah Bay, was where the chief of the Neah Bay village towed his whale for flensing. It was known in the Makah language as *či̓·ʔawa·ʔiyak*, “place for butchering whales.” Renker and Pascua (1989, no. 190) listed this site as a traditional cultural property retaining significance to the Makah Tribe. Other chiefs towed harvested whales to beaches closer to their villages.

There are several, unlisted shell midden sites in the Olympic National Park, and these are actively exposed along eroding beach terraces. There are also unlisted whaling sacred sites, where Makah Tribe whaling families and members would prepare for whaling. The locations of such sites are regarded as private knowledge that is not generally divulged to non-family members. There are no specific known locations that the Tribe uses continually and that could be considered historical sites.

In May 2008, the Fort Núñez Gaona – Diah Veterans Park was dedicated in Neah Bay. The monument, a collaboration of the Makah Tribal Council, the Spanish government, the Washington Office of Lt. Governor, Neah Bay area veterans, and members of the local community, is located at the site where the Spanish anchored in Neah Bay and laid claim to Cape Flattery in 1790. The monument also serves as a memorial to the Neah Bay veterans who served in the U.S. military.

3.10 Ceremonial and Subsistence Resources

3.10.1 Introduction

The following subsection presents the cultural aspects of the Makah Tribe's proposal to hunt gray whales for subsistence and ceremonial purposes (refer to Section 3.16, Human Health, for further information about the nutritional aspect of subsistence and ceremonial hunting). This section also includes a discussion of the symbolic value of the whale to the Makah people's cultural identity.

3.10.2 Regulatory Overview

The American Indian Religious Freedom Act of 1978 (42 USC 1996) contains the following language:

> . . . it shall be the policy of the United States to protect and preserve for American Indians . . . their inherent right of freedom to believe, express and exercise [their] traditional religions,. . . including but not limited to access to sites, use and possession of sacred objects and the freedom to worship through ceremonials and traditional rites.

Additionally, the Religious Freedom Restoration Act of 1993 (42 USC 2000b) provides protections for religious practice. The statute places the initial burden on a person to establish that religious practices have been substantially burdened. The Makah have asserted that the spiritual and ceremonial practices associated with whaling are protected by these two statutes (Makah Tribe 2006b).

In the Treaty of Neah Bay, the Makah Indian Tribe reserved its right to engage in subsistence activities, including hunting, fishing, whaling, and sealing in its usual and accustomed grounds (Subsection 1.2.2, Treaty of Neah Bay and the Federal Trust Responsibility). In the Ninth Circuit decision in *Anderson v. Evans*, the Court of Appeals expressly stated that ". . . [w]e need not and do not decide whether the Tribe's whaling rights have been abrogated by the MMPA." The court also noted that ". . . [u]nlike other persons applying for a permit or waiver under the MMPA, the Tribe may urge a treaty right to be considered" during review of the Makah Tribe's request (*Anderson v. Evans* 2004).

3.10.3 Existing Conditions

The Makah call themselves *qʷidiččaʔa·tx̌,* which is generally thought to mean "residents of the place of rocks and seagulls." They are, however, best known by the current anglicized name which is an incorrect pronunciation of a Salish term *máqʼáʔa* that means "generous with food" (Renker 2013). The Makah Tribe continues to reside on lands within their traditional territory situated on the northwest tip of the Olympic Peninsula, bordered by the Strait of Juan de Fuca and the Pacific Ocean. Tribe members maintain a strong orientation to the sea and the resources it provides.

Both linguistically and culturally, the aboriginal Makah people were closest to the Ditidaht and Nuu-chah-nulth peoples of western Vancouver Island, with whom they shared the occupation of whaling. While ties to these Canadian neighbors continue, the people of the contemporary Makah Tribe participate with other western Washington tribes as members of the Northwest Indian Fisheries Commission, whose mission is the conservation of fisheries (Northwest Indian Fisheries Commission 2005).

3.10.3.1 Makah Archaeological Resources Connected with Whaling

Much of the archaeological and historical evidence of the Makah whaling tradition was obtained through a large excavation of a Makah whaling village (Ozette) that was occupied by the Makah Tribe from 400 B.C. to 1920 (Subsection 3.9.3.2, Archaeological Sites). These archaeological investigations revealed about 2000 years of human occupation along the Olympic Peninsula in the Late Period of the Northwest Coast (Wessen 1981).

Aboriginal people began moving from interior riverine sites to the bays along the Pacific Ocean around 400 B.C., where they then adapted to a maritime orientation. This adaptation brought about an increase in sea mammal hunting, including whaling, which, along with deep sea fishing, necessitated the development of the large, seagoing canoes described ethnographically by Waterman (1920). An archaeological walking survey of Makah territory, complemented with test excavations at six additional sites representing divergent environmental zones, indicated that all of the investigated sites shared an orientation towards sea mammal hunting that was seen most clearly at Ozette (Friedman 1976).

Based on the recovery of whaling equipment and whale bones with embedded fragments of harpoon blades at the Ozette excavation, archaeologists determined that, for at least 1,500 years, the Makah Tribe paddled out to sea to hunt whales. Earlier, as evidenced by butchered whale bone in archaeological deposits, the Makah Tribe harvested drift and stranded whales (Huelsbeck 1994). The skeletal remains of the gray whale and humpback whale were both equally represented and the dominant whale species recorded in the deposits where the whale species could be identified, suggesting that they were actively pursued by Makah hunters. Moreover, the number of whale bones recovered from different areas of the site representing different time periods did not vary, suggesting that whaling remained stable. Artifacts recovered archaeologically indicate that whaling techniques described ethnographically by Drucker (1951) were used prehistorically (Huelsbeck 1994). Canoe fragments, harpoon shafts, harpoon heads, sinew ropes, and wooden plugs from seal skin floats have all been found (Huelsbeck 1994).

Most of the excavated bones identified as whale could not, however, be identified to species because of limitations of the comparative material available (Huelsbeck 1994).[70] Nevertheless, from the skeletal material that could be identified, archaeologists concluded that, at Ozette, whales represented much more food than all the other kinds of animals combined (Huelsbeck 1994). Researchers estimated that as much as 85 percent of the pre-contact diet of the Makah Tribe, that is, their diet before the first arrival of Europeans in the late 18th century, could have been composed of whale meat, oil, and blubber (Huelsbeck 1988). Archaeological evidence in the form of roughly cut and gouged bones suggests that the Makah, in addition to rendering blubber for oil, extracted oil from bones, a practice not reported ethnographically (that is, through interviews with Makah elders) or through observation of their practices. In addition, partially burned bone suggested roasting as a method of cooking the meat (Huelsbeck 1994). Fragments of whale skin were also found inside the remains of houses at Ozette, a finding consistent with Koppert's (1930) remark that whale skin was eaten. While Koppert (1930) thought that the entire whale was used, other reports differed on the extent of carcass used and/or consumed by the Makah (Waterman 1920).

3.10.3.2 Makah Cultural Environment

At the time of the treaty, the Makah Tribe permanently occupied five villages situated on the northwestern tip of the Olympic Peninsula before contact with Europeans: *di·ya·* or Neah Bay; *bi?id?a* or Biheda; *wa?ač̓* or Wayatch; *c̓u·yas* or Tsoo-Yess; and *?use·?ił* or Ozette. In addition to these five semiautonomous winter villages, Makah families occupied seasonal sites, such as fishing camps on the outer coast (Friedman 1976; Renker and Gunther 1990).

Anthropologists classify the Makah Tribe within the Nootkan (Nuu-chah-nulth) subdivision of the Northwest Coast Cultural Area, a cluster of societies that share certain traits and trait complexes. Drucker (1951) defines these traits as:

- A marine and riverine orientation that permeated not only subsistence practices but ideology and outlook
- An emphasis on fishing and marine mammal hunting, as well as the gathering of shellfish, other marine invertebrates, and plants

[70] More recently, Alter et al. (2012) identified DNA of gray, humpback, blue, and sperm whales from bones excavated at sites on the Makah and Quileute Reservations.

- A highly developed woodworking technology
- A tripartite system of social stratification that included nobles, commoners, and slaves
- An emphasis on property, both tangible and noncorporeal
- The integration of rank and kinship as the basis for social interaction

The Makah Tribe's location and wealth in natural resources placed tribal members at the hub of a far-reaching trading network that extended north to Vancouver Island, south to the Lower Columbia River, and east to the tribes of the Strait of Juan de Fuca. Whale oil and other coastal products passed along this network (Swan 1870; Renker and Gunther 1990).

3.10.3.3 Historic Makah Community

The Makah winter village was the primary residential community. The people lived in large, shed-roofed, cedar plank dwellings during the rainy winter months when resource harvesting activities were low and ceremonial life was more active. People identified themselves primarily with their winter village, but individuals maintained kinship ties with several villages, not all of them Makahs. Kin units among the Makah were organized on the basis of non-unilinear descent, meaning that members all acknowledge descent from a common ancestor traced through either males or females. Leadership tended to be controlled by a patrilineal core of elite residents, generally consisting of a father and his sons with their families, resulting in households being quasi-lineages that controlled production, consumption, and resources. Hence, these elite groups of kinsmen were the headmen of the households who owned the resources and organized the work of others for resource harvest and distribution.

The elite members of Makah society were the titleholders, the chiefs or nobles who held rights to inherited leadership positions. Despite their considerable prestige and ritual authority, however, they held limited political power. Chiefs had influence but could seldom compel other individuals to act against their will. Commoners and slaves formed the lower two strata of society. Commoners enjoyed the privileges of membership in their descent group and had access to resources and ceremonial prerogatives, although commoners did not have rights to ranked titles. Slaves, however, obtained through capture or purchase from other tribes, were human property devoid of rights (Drucker 1951; Colson 1953; Renker and Gunther 1990). Such distinctions in rank and status declined following guidelines set forth in the Makah Tribe's 1855 treaty and the establishment of the Neah Bay Indian Agency in 1863. Under the influence of Indian agents who promoted assimilation, the Makah Tribe's pre-contact, visible sociopolitical organization was weakened. In 1879, the community of Neah Bay held its first election for headmen, the result of which was recorded by James Swan, who noted that similar proceedings were soon to be held at the other Makah villages (Goodman and Swan 2003).

3.10.3.4 Makah Historic Whaling

At least seven species of whale are distinguished in the dialects of the Makah Tribe and their Nuu-chah-nulth neighbors (Swan 1870; Sapir 1910 to 1914; Waterman 1920; Densmore 1939; Stonham 2005), and archaeological remains have been found for at least eight cetacean species (Etnier and Sepez 2008), including blue, gray, humpback, and sperm whales (Alter et al. 2012). From review of the ethnographic record, especially the work of Drucker (1951), whales, from the perspective of the Makah Tribe and neighboring aboriginal groups on the Northwest Coast, differed little from humans: both have human form, live in houses (although the whales' home is at the bottom of the ocean), and travel about in canoes. The aboriginal people believed that the familiar bulbous gray form observed as whale (gray or humpback) was merely a whale spirit riding in its canoe while fishing (Sapir 1910 to 1914). By means of the whaler's ritual supplications, the whale's spirit was enticed to leave its canoe, which allowed the whale's body to be caught (Jonaitis 1999).

Ethnographic reports indicate that Makah tribal hunters pursued mostly gray whales and humpbacks (Waterman 1920; Drucker 1951), while skeletal remains in archaeological sites suggest that right whales and finbacks may have been taken occasionally, and sperm and killer whale remains probably represent salvaged drift whales (Huelsbeck 1988). The unifying characteristic of those whale species the Makah pursued was a slow swimming speed, enabling their capture by men in canoes. The hunting season for gray whales began in March, when they appeared in numbers off Tatoosh Island on their coastal migration north, and resumed in November during their migration south. Pods of humpback and gray whales may have remained in the area all summer (Huelsbeck 1994), permitting whale hunting to occur from early spring through the fall.

The killing of whales was the prerogative of titled men among the Makah Tribe (Swan 1870), largely because of the necessary elaborate rituals associated with whale hunting, the cost of outfitting an expedition, and the authority needed to assemble a crew (Drucker 1951). The success of the hunt relied upon the whalers' strict observance of ritual knowledge, which only the elite possessed and which the Makah Tribe believed to be the essential basis of a whaler. Knowledge of and adherence to the rites, along with spiritual assistance received through prayer to the ancestors, was reflected in a chief's wealth. Thus, in Makah theory, the rituals were responsible for one having wealth, and wealth demonstrated the presence and efficacy of a man's spiritual power. Wealthy men married the daughters of powerful chiefs, perpetuating the presence of an elite class and, by selecting spouses from other communities, creating a social and economic network through which wealth, people, and information passed. Drucker (1951) describes the Nuu-chah-nulth groom's harpooning of the door of the bride's house during the marriage ceremony, using an imitation whaling harpoon, complete with floats. The association of whaling with wealth and rank was also evident during marriage ceremonies such as one witnessed at Neah Bay in the 1850s, when the groom's party reenacted a whale hunt upon arrival (Hancock 1927).

In preparation for hunting, Makah whalers trained themselves to acquire spiritual strength and power so that the whale could be killed more easily. Training consisted of ritual bathing, praying, rubbing the skin with boughs or nettles, and imitative performances. Such practices took place at selected, secret locations that were regarded as spiritually powerful places, some of which included elaborate shrines adorned with carved figures and human skulls said to represent the whaler's ancestors (Waterman 1920; Gunther 1942; Drucker 1951; Jonaitis 1999). Each family or extended family had its own secret spot, usually no larger than a room, but kept private from all other families. Even the details of the bather's costume, the prayers, and the type of branches the whaler used were private knowledge that was passed from one generation to the next according to the rules of inheritance. The absence of centralized dogmatic control of spiritual and ritual practices was characteristic of Makah society. Thus, the practices described as general to the Makah in this document and recorded by anthropologists and other early observers may have been the practices of a particular extended family group, because ritual practice varied from family to family. The widow of one Makah whaler recalled how her husband visited a specific place immediately before the hunt and his training continued throughout the whaling season to be ready whenever whales were sighted (Gunther 1942).

Chiefs had two methods of obtaining whales: either hunting them from a canoe on the open water and harpooning them, or using ritual to entice them to die and float ashore. A focus of the whaler's ritual activity at his shrine was to entice the whale to relinquish its spirit and allow its body to drift ashore, thereby permitting the chief to avoid the dangers of hunting at sea (Drucker 1951; Jonaitis 1999).

The whale had a special relationship to the noblewomen and, during the hunt, the whaler's wife would act as if she had become the whale. Her movements would determine the behavior of the whale—if she moved about too much, the whale her husband was hunting would be equally active and difficult to spear; if she lay quietly, the whale would give itself to her husband. Towing chants often reflected this association, and the whalers addressed the dead carcass using a term that refers to a chief's wife. His wife greeted the whale when the hunters towed the carcass to shore, and she led the procession to the chief's house (Drucker 1951). This transformation that occurs during the ritual (i.e., noblewoman becoming a whale) has an empirical connection, as the presence of the whale in the village validates the chief's spiritual power, authority, and wealth, including his bond to noblewomen who are themselves descendants of great whalers (Gunther 1942; Drucker 1951).

Hunting crews were led by the titled nobleman who owned the 30-foot (9.1-m) cedar canoe and its specialized equipment and acted as harpooner. There were typically seven other crew members, including a steersman and six paddlers, one of whom was also a diver who fastened shut the whale's mouth after it had been killed. Each of the eight-man crew was physically fit and either possessed hereditary access to the position and its complementary ritual knowledge, or obtained such knowledge through a supernatural encounter (Curtis 1916; Waterman 1920). Each man dressed in special skin clothing adorned with feathers (Sapir 1910 to 1914). A number of canoes hunted together, each outfitted with harpoons, sealskin floats, harpoon lines of whale sinew and others of cedar, and a variety of knives (Waterman 1920). Several ethnographic reports containing information based on accounts from whalers have described the hunt (Curtis 1916; Drucker 1951). In one hunting strategy, lookouts were stationed at coastal high points to alert hunters of the presence of a whale. When a whale was sighted from shore, the Makah hunters set out in previously equipped canoes that were kept ready for use. Whales could often be observed close to Umatilla Reef and Swiftsure Bank, near the entrance to the Strait of Juan de Fuca, where the migrating whales would be feeding. A hunt could last for several days and take the hunters far out to sea, a journey that required considerable navigational skills (Waterman 1920).

Curtis' (1916) description of the hunt conveys some of the hunters' specialized knowledge and finely tuned skills that were the necessary complement to the rigorous spiritual training each hunter endured. Yet there was likely no skill more important than that of the chief who wielded the immense harpoon and, only several feet from the whale, thrust it into the flesh of the submerging prey, after the whale's flukes went underwater and could not upset the hunters' canoe. Once harpooned, the Makah hunters threw several other harpoons into the injured animal, until it was finally exhausted. Then the whale hunters began singing to the whale, imploring it to head shoreward as they started the arduous task of towing home their immense catch. When the hunters followed the prescribed rituals, the whale spirit left the body of its host, and the hunters successfully towed the whale to the chief's village for butchering. As they traveled, the hunters continued to sing chants encouraging the whale to move to shore (Curtis 1916; Waterman 1920; Drucker 1951).

First Beach, situated next to Neah Bay, was where the headman towed his whale for flensing. It was known in the Makah language as *či̓·ʔawa·ʔiyak*, “place for butchering whales.” Renker and Pascua (1989, no. 190) listed this site as a traditional cultural property retaining significance to the Makah Tribe. Other chiefs towed harvested whales to beaches closer to their villages (Subsection 3.9.3.3, Other Culturally Important Sites).

The villagers hauled the catch as high on the beach as possible. In some communities, all the village children helped pull the whale the last few yards (Drucker 1951). Butchering procedures depended on the species, but ritual and ceremony always accompanied the initial steps as an elderly whaler made the first cut into the whale, now decorated by the Makah with eagle feathers and white down taken from waterfowl, and the men began to strip away square slabs of the valuable blubber. The dorsal section, richest in oil, was reserved for the chief hunter, though he is reported often to have sold or given it away. Choice morsels were reserved for the hunters and for those leading men who had rights to particular pieces of the whale. The chief whaler, dressed in ceremonial gear, also entertained the villagers with his songs and imitations. He provided the villagers with freshly cooked blubber from his catch and distributed the remainder. The villagers, in turn, sang songs honoring the chief’s and the whale’s prowess and generosity. For as many as four nights, the chief led the community in ceremonial performances marked by imitations of the whale, the hunt, and songs that praised the whale. Individual whalers owned different songs (Swan 1870; Waterman 1920). Drucker (1951) noted that the Nuu-chah-nulth carried the concept of ownership to “an incredible extreme,” with the result that all ceremonial privileges, such as the right to use certain songs and dances, perform certain rituals, or certain acts within them, were owned property.

The Makah probably regarded the whale as a guest in the village in the same way as the Nuu-chah-nulth of Vancouver Island. Thus, once the community had feasted, the hunters had to return the whale’s spirit to the sea by casting small pieces of flesh and blubber into the ocean where it could not wash up on shore (Curtis 1916). The whale carcass was then left for the villagers to help themselves (Drucker 1951). This activity was shared by “the entire tribe, great and small, male and female,” according to one observer in the 1850s (Hancock 1927), after which the birds and other scavengers picked at the remains on the beach (Waterman 1920). Thus, once the chief had directed the removal of all the blubber, to be eaten fresh or rendered into oil, the villagers took most of the flesh, also for consumption, in addition to the bones and baleen, as needed.

Drift whales—those whales that drifted to shore after death—were reported to the beach owner by messengers who were paid for the find. The drift whales were examined to identify any signs of ownership, indicated by specific marks on any harpoon heads embedded in the whale's flesh, or on seal skin floats attached to the harpoon. Whales that had been identified as lost after being harpooned, or that had been cut free when bad weather threatened the hunters' return home, belonged to the hunter, unless another chief's mark was identified. The villagers would congregate on the beach to strip the whale's blubber for their respective chief, after which the people would help themselves to the meat and blubber, again leaving the carcass with most of the bones (Drucker 1951).

Meat that was decayed, which sometimes occurred with drift whales, or whales caught too far from shore on which the flesh began to rot, was left on the beach along with the bones. The villagers took the bones from the beach only when they could serve some purpose; thus, the skeleton with any remaining morsels of meat remained on the shore or was washed out to sea (Waterman 1920; Drucker 1951). Blubber, however, seldom deteriorated to the extent that it could not be used, if only for technological purposes, and it was not consumed (Waterman 1920; Drucker 1951).

Whale products provided enough blubber and oil for the aboriginal village, as well as a surplus of oil to be traded with neighboring tribes (Huelsbeck 1988). An account of exchange included in the journal of John Jewitt, a crewman from an American vessel taken captive by the Nuu-chah-nulth chief Maquinna in 1803, noted that Maquinna's trade with neighboring tribes was "principally train oil," and from the Makah he received "great quantities of oil" and whale sinew (Jewitt 1993). The oil was stored in boxes specially made for the purpose or in bladders or stomachs of marine mammals and certain large fish (Curtis 1916). Whale oil was a standard condiment served with meals, typically used as a dip for dried foods such as salmon and berries (Drucker 1951). Whale oil was also thrown on central fires to fuel the blaze during rituals, and at least one visitor to the area in the mid-1800s observed shell lamps in which whale oil was burned (Drucker 1951). The Makah Tribe made offerings to the supernatural world by burning feathers and whale oil, an act accompanied by prayers from the head of the household (Curtis 1916). In the 1840s, Makah traders provided whale oil to the Hudson's Bay Company's Fort Victoria for shipment to England (e.g., Fort Victoria Journal, December 7, 1846). Additionally, Makah craftsmen used bones and baleen as raw material for tool manufacture and bones as building material (Huelsbeck 1994).

The ethnographic literature is inconsistent regarding the consumption of whale meat, the dark flesh found under the thick layer of blubber (Waterman 1920). Stories recorded by Edward Sapir in the early 1900s tell of Nuu-chah-nulth villagers boiling fresh whale meat, drinking the broth (Arima et al. 2000), and giving feasts of meat and blubber (Sapir 1910 to 1914). Drucker (1951) confirmed Curtis' (1916) earlier report that the whale flesh could be both sun and smoke dried, although statements by Drucker's Nuu-chah-nulth consultants indicate that the meat was dried in smaller quantities than the valuable blubber. So rich was the partly dried blubber that pieces of it were given to suckling newborns until the child's mother could produce enough milk, generally by boosting her own nutrition with extra servings of blubber (Curtis 1916). Swan (1870) reported that only the vertebrae and offal were left unused. Among the whale bone artifacts recovered from the Ozette site are spindle whorls, bark shredders and beaters, cutting boards, clubs, wedges, and tool handles (Huelsbeck 1994). Drucker (1951) also reported the historic use of whale bone for such implements.

Historical and ethnographic accounts provide only rough calculations of the numbers of whales taken annually. The catch of 15.99 and 36.9 tons of blubber was reported and likely a similar amount of meat, depending upon whether the whales were Pacific grays or humpbacks, respectively (Huelsbeck 1988). Another source, writing specifically of the Makah Tribe, estimated that an average whaler might take one or two whales a year, but that a skilled and fortunate hunter might catch as many as five in the same period (Densmore 1939). This is a higher estimate than the numbers harvested between 1889 and 1892 when the entire Makah Tribe (including all whalers) averaged 5.5 whales a year (Huelsbeck 1988).

Reassessments of the role of whaling in aboriginal society indicate that whaling had great economic significance (Huelsbeck 1994) and was not simply a "symbol of chieftains' greatness," with "little economic importance," as anthropologist Philip Drucker (1951) once described whale hunting, in light of the few whales caught by Nuu-chah-nulth men he interviewed in the mid-1930s. Ceremonies, music, and dance associated with this occupation, based on chiefly ownership and rank, held a central role in the maintenance of the Makah social system. A titled family maintained its standing by hosting ceremonies, particularly intervillage potlatches, performing hereditary songs, displaying owned prerogatives, and giving away food and gifts, all of which required great wealth. Even before a successful hunt, whaling chiefs held potlatches at which they made gifts of sticks said to represent strips of blubber to be given at a later date (Drucker 1951). The hereditary privileges owned by whalers and displayed at significant events were games and songs associated with the whale (Goodman and Swan 2003), among them a performance in which the dancers wore gear and imitated the motions of a whale (Densmore 1939).

3.10.3.4.1 Cessation of the Hunt

Historical and ethnographic records indicate that the Makah Tribe hunted whales until the 1920s when this practice went into abeyance. However, this period represented the conclusion of a gradual decline in whale hunting that had taken place since the 1855 Treaty, when 30 Makah canoes hunted together, and each canoe was said to have processed 1,000 gallons (3,785 L) of oil (Swan in McDonald 1972). Swan (1870) noted that, even in the 1850s, the Makah Tribe was whaling less than in the past, but he could provide no clear explanation for the decline.

An account of one of the last Makah Tribe whale hunts was reported to the *Victoria Daily Colonist* in 1905, largely because of the observer's fascination with the Makah Tribe's use of new technology for whaling. In that hunt, 60 Makah hunters in six large canoes stalked a whale. Once the main harpooner hit the prey, his fellow hunters thrust a large number of iron-tipped harpoons into the injured animal. A steam-powered commercial tow boat then pulled the whale into Neah Bay for butchering (cited in Webb 1988).

By 1916, Curtis (1916) observed that the Makah Tribe had recently revived the practice of whaling. It is clear, however, that the hunt had been untenable for a number of years and had ceased completely by the 1920s. Social, economic, and biological factors all contributed to the Makah's cessation of the hunt. It was not the first time that the Makah Tribe interrupted a marine-based occupation. Makah witnesses appearing before the British Commissioners investigating the pelagic fur seal industry in the 1890s reported "for about twenty years the hunting was practically given up" because of the loss of lives at sea while hunting (cited in Crockford 1996). The Makah Tribe resumed this activity in the early 1900s when conditions improved.

Research by Jennifer Sepez (2001) reveals that some Makah families continued to use whale meat and oil after the 1920s, when the hunt was discontinued. However, Sepez hypothesized that the likely source would have been from beached whales, whales caught in fishing nets, or possibly aboriginal whale hunts that continued to occur in Canada in the 1930s. At this time, British Columbia canneries sometimes processed whale meat obtained by aboriginal hunts (Webb 1988).

3.10.3.4.2 Factors Responsible for Discontinuation of the Hunt

Robert L. Webb's (1988) history of commercial whaling documents a steady decline in all species of whale that became the target of commercial whalers. Historical evidence indicates that whaling in the lagoons of Mexico and Baja California in the 1840s, and the shore-based commercial whaling that began off the California coast in 1851, significantly reduced the once-healthy stocks of migrating ENP gray whales along the western coast of Washington. One observer estimated that, around the mid-1850s, 1,000 whales could be seen each day between December and February making their southern migration, suggesting to Scammon (1874) that whales migrating along the coast of California likely numbered about 30,000 a season. When Charles Scammon published his first edition of *The Marine Mammals of the North-Western Coast of North America* in 1874 only 20 years later, he estimated that the number of migrating gray whales did not exceed 10,000 whales.

With the development of the darting gun around 1870, which replaced the iron harpoon hurled by manual strength from the bow of a whaleboat, it became possible for commercial whalers to kill humpback whales (Webb 1988). This placed the industry in direct competition with the Makah Tribe, who hunted this species along with the gray whale.

The new whaling methods included steam-powered chaser boats on the sea and oil-fired steam rendering plants on shore, making easier, faster hunts possible and providing diverse new products from the raw materials. Although whale oil now competed with less costly petroleum products and vegetable and mineral oil, new ways of processing the oil kept it in demand and facilitated a renewed interest in whaling on the northwest coast in the early 1900s (Webb 1988). Humpback whales found in inlets and bays were hunted, along with blue and finback, and a new factory-ship technology permitted a resurgence of the gray whale hunt. Over a 10-year period, whale stocks dwindled. Thus, when the Makah Tribe and their Nuu-chah-nulth neighbors on Vancouver Island attempted to hunt whales in the early 1900s, few whales remained in the local waters (Webb 1988).

When World War I began, the government urged the public to consume whale meat without much success, as most Americans did not have a taste for the meat, although it appears that the Makah Tribe continued to enjoy it and consumed some whale meat processed by Canadian canneries (Goodman and Swan 2003). By the 1930s, with whale stocks almost entirely depleted, the whaling countries began to see the need to control the numbers of whales being taken. At a London conference in 1937, member countries adopted the International Agreement for the Regulation of Whaling, which applied stringent controls on the numbers and species of whales being killed. The gray whale became protected, along with right whales (except for a few taken by permit), by those countries participating in the agreement (Webb 1988). Commercial hunts depleted stocks of humpback whales as well, but international agreements did not protect this species until 1965 (Webb 1988).

In addition to depletion of whale stocks, the Makah's increasing involvement in the pelagic fur sealing industry also contributed to cessation of the whale hunt. The skills that made the Makah successful whale hunters also made them valuable participants in the pelagic sealing industry of the nineteenth century. This commercial industry was an outgrowth of the Makah Tribe's aboriginal subsistence and fur-trade sealing efforts. By the 1860s, commercial sealing substantially relied on an aboriginal wage-labor force with the knowledge of navigation and watercraft needed to succeed at sealing. The shore-based hunt was considered dangerous, as the hunters followed the seals far from land in open canoes. In 1865, the Indian Agent at Neah Bay began chartering schooners to assist the Makah in their offshore hunts (Lane, cited in Crockford 1996). By the mid-1870s, the schooner owners benefited from the near-abandonment of the aboriginal people's shore-based seal hunt, as more men signed on to work from schooners and hunt seals (Crockford 1996).

The pelagic seal hunt relied upon certain elite tribal men continuing in their role as administrators of community economic activities. Whereas these men formerly organized the harvest and distribution of local resources, they now organized crews for the schooners. However, the more equitable distribution of the proceeds equalized the relative ranking of the participants, as the trade economy elevated the resource beyond the level of subsistence and put greater wealth directly in the pockets of crew members (Crockford 1996; Goodman and Swan 2003). Commoners were now ostensibly equal to chiefs, with opportunities available to them as individuals. Thus, the titled class could no longer expect the privileges that aboriginal whaling had helped them maintain, except in ceremonial potlatches and social networks. By 1875, sealing for furs was the Makah Tribe's chief form of income. By 1893, Makah tribal members owned 10 sealing schooners. These vessels earned a healthy income for their aboriginal owners, but set these men apart from those who did not share in the profits of the new economy. Eventually, over-harvesting and government regulations led to diminished profits and, ultimately, the end of the seal hunting industry. In 1897, the United States government signed an international convention that effectively banned pelagic seal hunting by its citizens, and the once-successful Makah hunters were left waiting for compensation for their lost business, which they believed had been secured to them by treaty. As late as 1957, Murray (1988) reports the Makah Tribe was still appealing to Washington for payment as a result of losses incurred because of the 1897 law and the seizure of a Makah sealing schooner operating in Alaska. Shooting harbor seals for food continued through the 1990s, long after the hunting of fur seals ceased, as seal oil provided the Makah Tribe with fat that was rendered into oil and used as a condiment (Sepez 2001).

Government agents among the Makah Tribe made considerable, yet ineffective, efforts to promote self-sufficiency through agriculture on the reservation. Some agricultural opportunities became attractive to the Makah Tribe, especially because crop production provided cash, was open to all members of society, and, in the case of the hop and berry fields, permitted families to remain together while they worked as wage laborers. Unlike occupations such as sealing, in which only men were hired, and several Makah men became affluent, whole families could be employed on farms for low wages. Government agents also encouraged Makah children to adopt new values introduced through Christianity and education. In the 1870s, the United States government made potlatching, bone games, and other ceremonial activities illegal, as these activities were regarded as primitive and backwards, resulting in the Makah Tribe's loss of hosted occasions that advanced and recognized the status of leading whaling families (Goodman and Swan 2003). By the early 1900s, the Makah Klukwali (wolf ceremony) and Tsayak (curing ceremony) secret societies involving dramatic reenactments that had been performed by such families, had faded from public view (Goodman and Swan 2003). These secret societies either relocated to offshore islands or adopted a European-like façade to avoid interference by American authorities.

Another direct effect of government policy occurred in 1879 when the first election of chiefs or headmen took place at Neah Bay, followed by elections in the other Makah communities (Goodman and Swan 2003). It is likely that the community elected men of high rank, thus undermining the Indian agents' efforts to equalize the position of all Makah tribal members. Introduction of the dominant American society's values, including the ideal of equality among all persons, was an expressed goal of United States government Indian assimilation policy in the late nineteenth century (Goodman and Swan 2003). Yet the Indian agents' attempts to displace the authority, and consequently diminish the acquisition of wealth that accompanied chiefly positions, including that of the titled men who once carried out the whale hunt, took its toll on the community's recognition of traditional leadership. In the absence of the hereditary system, disagreements arose among those still claiming chiefly descent who expected recognition of the rights that flowed from these inherited positions (Goodman and Swan 2003). Despite changes in leadership positions, Makah families of high status kept alive some of the practical and ritual knowledge associated with the whale hunt, even in times of inactivity, although the relative influence of these families within the community declined with the changing economy (Drucker 1951; Goodman and Swan 2003). Drucker found similar retention of whaling knowledge among the Nuu-chah-nulth (1951). In the mid-1930s, he found that the chiefs of one group passed down "both ritual and practical features of the [whaling] complex" to four generations without whaling, before their resumption of the hunt. According to Renker (2012), this transfer of whaling knowledge within Makah families has continued to the present day. The Tribe's 2012 needs statement explains:

> . . . the Makah desire to reinvigorate the whaling tradition never dissipated. Households took advantage of drift whales for food and materials before federal communications and supervision began to prohibit this practice. Families pass on whaling stories, traditions, songs, and secrets from generation to generation. Whaling designs and crests still decorate public buildings and private homes. Makahs proudly display historical photographs of their whaling ancestors in their homes, and the public school on the reservation exhibits whaling artifacts and photographs. Accounts of Makah whalers are read again and again in school and homes. Whaling displays in the Makah Cultural and Research Center and other museums keep visual scenes in the heads and hearts of Makah people (Renker 2012).

3.10.3.5 Contemporary Makah Society

Several post-contact factors (i.e., influences brought about after the arrival of the first Europeans in the late eighteenth century), including epidemic disease and mandatory schooling, resulted in consolidation of the five traditional villages into the single community situated at Neah Bay where most of the on-reservation Makah population now resides. The Neah Bay community primarily consists of single-family dwellings, including mobile homes and Housing and Urban Development houses, with housing for seniors located in the center of the village across from the Senior Citizens Center. The churches, schools, public health facilities, Makah Cultural and Research Center, and a large community center, where revived potlatches, bone games, and other community functions are held, are located in the community of Neah Bay.

Since 1931, Neah Bay has been connected with communities to the east on the Olympic Peninsula by road, although Makah life remains oriented to the sea. Subsistence and commercial salmon and halibut fishing have remained central to the Makah economy, especially after the cessation of the pelagic sealing industry at the end of the nineteenth century, because of the reservation's proximity to some of the biggest halibut fisheries on the Pacific coast (Colson 1953; Sepez 2001). From the 1950s through the 1970s, Makah men worked as loggers cutting timber from the reservation and nearby hills (Colson 1953).

The Makah Air Force Base, established in the area in the 1940s, closed in 1988. Its facilities are now occupied by tribal agencies and Tribal Council offices (Goodman and Swan 2003). Notwithstanding personal preference, a chronic housing shortage at Neah Bay now requires some tribal members to live in neighborhoods outside of Neah Bay, specifically Wa'atch, Baadah, Pacific Beaches, Diah't, and a housing development at Eastern Bayview (Sepez 2001).

The lineage group, or Makah family, is the fundamental element of contemporary intratribal identity, according to Sepez (2001), who notes that it is also the basic social unit in which cultural traditions are passed between generations. Families hold divergent views of tradition, especially in spiritual and ceremonial activities, but also in the types of natural resources harvested and the amounts consumed. Most households, however, consume local subsistence foods during the year (Sepez 2001).

Logging that sustained the community relatively prosperously in the mid-twentieth century has now declined, although the Tribe operates Makah Forestry Enterprise, an expanding company engaged in forest management both on and off the reservation. Fishing, which had also declined, is now providing a higher total income than in the recent past because of the development of trawl fisheries. Apart from these industries and a few small business enterprises, government is the largest employer in the area. Makah tribal members no longer work in agriculture, because the hop and berry fields of western Washington turned into residential areas. Tribal artists produce jewelry, silk screen prints, and clothing with aboriginal designs for sale in local shops.

In response to the 1934 Indian Reorganization Act, the Makah Tribe wrote a tribal constitution and created the Makah Tribal Council, which replaced the former system of chiefs as the daily political arm of the Makah Tribe. Any enrolled member of the Tribe who resides on the reservation is now eligible to run for office, regardless of the class, rank, or status of particular ancestors (Goodman and Swan 2003). Other government policies were also reversed by the 1934 statute, particularly the previous practice of allotting tribal land to individuals. The act also supported Indian religious freedom and promoted a revival of Makah culture (Goodman and Swan 2003). Congress enacted the American Indian Religious Freedom Act in 1978 to further protect and preserve American Indians' inherent right to freedom to believe, express, and exercise their traditional religions (Trope 1994). This act was followed the next year by the Archaeological Resources Protection Act of 1979, which specifically mandates that the American Indian Religious Freedom Act be considered in the disposition of archeological resources. Subsequent legislation, the Native American Graves Protection and Repatriation Act of 1990, mandated the return of Makah and other tribes' sacred objects, objects of cultural patrimony, human remains, and associated funerary objects from federal agencies and federally funded museums (and universities) (Thornton 1994).

Makah Days, initially started in 1926 to celebrate the extension of American citizenship to American Indians, have evolved into a major 3-day event held each August. The event celebrates Makah culture and attracts hundreds of visitors, both aboriginal and non-aboriginal. Months of community preparation culminate in a cultural festival highlighting traditional foods, dancing, singing, and games, in addition to more contemporary events such as a parade, fireworks, and sporting events (Tweedie 2002). For this occasion, families share their less prestigious songs and offer training in dancing to non-family members. The songs and dances are used for public performances that, along with displays of athletic excellence, generate feelings of Makah solidarity in friendly opposition to other tribes, reinforcing the Makah Tribe's identity (Bates 1987).

Traditional Makah ceremonials that had declined by the 1950s have had a resurgence, beginning in the 1960s, because of the diligence of a small group of elderly Makah women who were well trained as children and retained knowledge of ceremonial affairs. They guided a new generation of Makah tribal members who valued the cultural traditions of their people and began hosting community events (Goodman and Swan 2003). This coincided with the archaeological recoveries at the ancient Ozette site, which provided a material foundation for the revitalization of cultural activities. The Ozette investigations provided an important impetus for renewed respect of and interest in the knowledge of Makah elders who worked cooperatively with archaeologists in identifying artifacts. These individuals also provided the necessary guidance to establish the Makah Cultural and Research Center, a tribally owned and operated institution committed to the support of Makah cultural activities and the interpretation of the Ozette artifacts (Erikson 2002). The Makah elders decided to showcase the hunting of whales and seals in the Makah Museum's displays (Sepez 2001).

A number of clubs devoted to cultural activities also began in the 1950s and 1960s, including the Makah Club, the Sla-hal Club, the Makah Arts and Crafts Club, the Hamatsa Club, the Makah Canoe Club, and the Warrior's Club (that honored tribal members who served in the United States military). The re-valuation of Makah traditions that occurred during this time provided an impetus for families to bring out songs and dances that had not been performed in decades (Erikson 2002). Federal funds made supplementary cultural programs possible, including a comprehensive summer program with funds for elders to develop classes in traditional crafts, music, and the Makah language (with a Makah language K through 12 program in the schools) (Erikson 2002). The resurgence of these programs has provided new outlets for Makah traditions;

community events are now common occasions for singing and dancing, and the museum provides ongoing educational programming (Erikson 2002).

Potlatching increased in the 1960s, along with the resurgence in cultural awareness. Among the Makah tribal members, this activity appears to fluctuate with economic times. When better economic prospects returned with an improved United States economy in the 1990s, several families hosted potlatches, some costing as much as $15,000 per ceremony (Goodman and Swan 2003). Ceremonial affairs may lack the complexity of former events, Goodman and Swan (2003) observe, yet many potlatch elements described in the nineteenth century can still be seen today as singers perform family-owned songs, young people receive ancestral names, guests participate in group dances, and the hosts serve great quantities of traditional native foods. Many of these songs and dances are those passed down among high-status whaling families and are used to publicly display their family wealth gained and maintained through generations of whaling.

For traditionally minded Makah, a spiritual life is tied to the lands and waters of their territory; remote places devoid of human activity where private cleansing rituals can take place without intrusion, and initiates can draw near to the supernatural part of the world. Individuals perform rituals and seek proficiency in whatever endeavor they undertake by strengthening their relationship with particular spirits (Drucker 1951). The arduous requirements of whaling have led to the rejuvenation among some Makah hunters of whaling rituals, which are based on private family knowledge (Braund and Associates 2007).

3.10.3.5.1 Makah Whaling

The cultural role of whaling is demonstrated in the archaeological record and in the ethnographic accounts of the twentieth century that have been summarized above. These published accounts now supplement the Makah Tribe's oral traditions as they prepare for the contemporary whale hunt and consider past traditions for future manifestations of their culture. Many traditions related to whaling have waned, however, since the Makah Tribe's cessation of the hunt in the 1920s. Nevertheless, some of those individuals taking a leading role in revitalizing this occupation are from whaling families who trace their ancestry to men who formerly hunted whales (Tweedie 2002). At the same time, the Makah Tribe is actively revitalizing its language and cultural traditions. According to Renker (2012), "Makah people had never stopped educating their children about their respective familial whaling traditions." Furthermore, the public school included a whaling curriculum, and the Makah Cultural and Research Center supported whaling education efforts. Renker (2012) noted, "While non-Makahs perceived a large temporal gap in the whaling history of the Tribe, tribal members saw continuity. Many individuals were patiently waiting for the whaling traditions to be taken from storage and implemented in reality."

The day in 1997 that the IWC acted on the United States' request on behalf of the Makah Tribe was marked on the Makah Reservation with celebrations, including giving tribal employees a half-day off and 30 local vehicles forming an impromptu parade, some of the cars and trucks appropriately decorated and horns blaring. An anthropologist observing the event later wrote, "It seemed that the entire village lined the parade route" (Tweedie 2002). The celebration continued the following week with a community potlatch at which tribal singers performed victory songs.

The Tribe sought to measure community opinions about whaling and involvement in the 1999 hunt in household whaling surveys conducted in 2001, 2006, and 2011 (Renker 2012). Surveyors canvassed the opinions of 35 percent of the on-reservation population concerning their views on the Tribe's resumption of whaling (Table 3-37). The expressed purpose of the survey was to address concerns of some non-tribal citizens who believed that the Makah Tribe did not support whaling and wasted the whale products from the 1999 hunt. Anthropologist Ann Renker Ph.D., who since 1980 has worked with the Makah Tribe, designed the surveys with input from the Makah Cultural and Research Center. Dr. Renker also analyzed the results of the surveys, administered by a team of trained Makah tribal members.

For the 2001 survey, 217 households of enrolled Makah tribal members were randomly selected and contacted for the study, and 159 households agreed to participate. Four selected household heads who had publically opposed the hunt declined to participate in the survey. The survey instrument for each of these individuals was marked negative for all questions regarding support of the hunt or use of whale products and, thus, was included in the tabulation of results representing the views of 163 households. All respondents were at least 21 years old and enrolled Makah tribal members residing on the reservation. The respondents' confidentiality was maintained by using numbered surveys, keyed to a master list of households used for administration purposes, but not released to Dr. Renker during her analysis of the results. All three surveys had results that differed in some respects but were substantially similar in others.

Table 3-37. Makah Attitudes Toward Whale Hunting

		Year		
		2001	2006	2011
Number of Respondents		159[1]	152	170
Should the Tribe continue to whale hunt?	Yes	93.3[2]	88.8	94.1

Motivation for support?[3]	Treaty Rights	46.1	40.8	37.6
	Diet/health	35.5	26.3	15.9
	Restore culture/tradition	36.2	44.1	56.5
	Spiritual benefits	20.4		
Is the whale hunt a positive force for the Tribe?	Yes	96.2	89.6	85.2
Would you like to have more access to whale products in the future?	Yes	91.2	80.2	90.6
Have you or a member of your household engaged in ceremonial whaling activities since 1999?	Yes	28.3	42.2	23.8

[1] Four tribal members surveyed in 2001 declined to complete the surveys. The percentages report the percentage for each answer based on 159 respondents, except the question about support for the hunt, which counts the four as "no" responses, for a total of 163 respondents.

[2] Renker (2012) reports two different sets of numbers for the responses to this question. The difference may be different treatment of the four tribal members surveyed who stated opposition to the hunt and did not complete the survey. The percentages shown here count those four tribal members as opposed to the hunt.

[3] Respondents could choose multiple answers; therefore, totals can exceed 100 percent.

Sepez (2001) also concluded that many tribal members desire whale products, with 73 percent of households planning to eat whale obtained from future hunts. Some household members clarified that, while they would not cook whale products themselves, they would consume whale if it were served at community feasts.

In the 2001 survey, 79 percent of the survey respondents reported that they watched television coverage of the whale being taken. A larger number, 81 percent of the 163 respondents, met the hunters on the beach when the whale was brought ashore. An estimated 1,400 tribal and non-tribal people witnessed the arrival of the whale and its hunters to Neah Bay. People traveled to Neah Bay from other communities to participate in the festivities and camped or stayed with relatives during festivities associated with the successful hunt (Renker 2002).

When asked about the positive benefits to be derived from continuing the hunt, 52 percent of the respondents reported a correlation between the hunt and a better lifestyle (Renker 2002). They viewed the hunt as a vehicle to reinforce traditional Makah values, such as pride, self-esteem, and male responsibility, in addition to combating the contemporary problem of substance abuse (Renker 2002; Braund and Associates 2007). As preparation for the 1999 and 2000 hunts, Makah whalers reported enduring intense physical and spiritual training, which culminated in a deep bond among whalers (Braund and Associates 2007). Such preparation is considered a private affair among the Makah families (Braund and Associates 2007). In some cases, whalers identified individuals who underwent major life changes as a result of participating in the whale hunt (Braund and Associates 2007).

As in the past, the killing of a whale is a focal event in which many Makah people are directly or indirectly involved. Table 3-38 lists some of the activities involved in the 1999 whale hunt, with a tally of the numbers or percentages of Makah tribal members involved in each activity, based on data obtained during the household whaling survey and contemporary ethnographic literature (Renker 2002; Bowechop 2004; Bowechop 2005a). Some individuals are counted in more than one category in Table 3-38.

Table 3-38. Numbers and percentage of participants in the 1999 Makah whale hunt.

Activity Associated with the 1999 Hunt	Numbers/Percentage of Participants
Members of the Whaling Commission	23 Makah men representing "all major families"
Preparation of equipment, including canoe	2 Makah men, plus Nuu-chah-nulth mentors who built a canoe, and 20 to 25 people making equipment
Training for hunt crew	18 to 20 Makah men
Whale hunt crew	1 canoe (1 head harpooner, 7 men) and 1 chase boat (5 people), all Makah
Towing crew	5 canoes (main canoe and 4 support canoes) and 1 fishing boat; about 60 people, 4 canoes from supporting Northwest tribes
Attendance on beach	1,400 people, mostly Makahs
Butchering	100 people, mostly Makahs
Distribution crew	50 Makahs
Consumption of meat/oil	81 percent of household whaling survey respondents
Attendance at post-hunt community feast	95 percent of household whaling survey respondents; approximately 3,000 people total "Thousands of other friends and relatives joined our tribe."
Attendance at parade	79 percent of household whaling survey respondents; about 400 people total
Participation in post-hunt ceremonials	38 percent of household whaling survey respondents
Use of bones	Approximately 60 school children, mostly Makah
Use of baleen	8 Makah hunters

Source: Bowechop 2004, 2005a.

Considering that 43 percent of the respondents also stated that the hunt fostered Makah and intertribal unity, the hunt seemed to be a means of bolstering social accord within the community.

The hunt, in conjunction with whaling-related discoveries made at the Ozette Village site and establishment of the Makah Cultural and Research Center, also provided the opportunity for the revival of Makah whaling rituals and traditional knowledge after a 70-year hiatus (Braund and Associates 2007). Hunters reported that the spiritual and physical training, the new-found whaling knowledge and skills gained from the experience, and the activation of inherited whaling customs and attitudes from older Makah tribal members (obtained orally and through the ethnographic collaboration of previous generations) strengthened tribal member identity as descendants of Makah whalers (Tweedie 2002). Tribal members reported that whaling songs and rituals also resumed following the 1999 hunt, with more people participating in family songs and sharing traditional knowledge (Braund and Associates 2007).

Reintroduction of whaling activities also facilitated a specific vocabulary, now mostly in English, but some in the Makah language, that encapsulates context-based traditional ecological knowledge that once was widespread in the community (Bowechop 2005a). Without engaging in the hunt, this knowledge lay dormant in the memories of the elders in a few families and in the ethnographic accounts of previous generations. Bowechop (2005a) reports a gradual increase in the attendance of language and cultural classes, with the highest attendance corresponding with the resumption of the whale hunt.

The whale hunt provided new experience-based educational opportunities that went beyond the current efforts of the Makah Cultural and Research Center to recover the language, crafts, and Makah ecological concepts that Sepez (2001) explains are offered in schools and at summer camps and underlie and sustain the elders' ecological teachings. The quest for knowledge relating to the ancient activity of whaling reached beyond the whaling crew and community children, for the majority of respondents in the Makah household whaling survey reported a desire to learn more about preparing whale products and using whalebone. They expressed a willingness to share such information with other Makah tribal members (Renker 2002). Seventy-six percent of Makah households expressed a desire for whale bones, presumably to revitalize certain crafts. The Makah Tribal Council, however, decided to offer the 1999 whale hunt bones to the local public school for a bone preservation project. Instructors taught Makah students how to clean skeletal remains and reassemble the whale skeleton for museum display. Early in December 2005, with the reconstruction completed, the whale skeleton was hung in the Makah Cultural and Research Center. Approximately 60 students participated in this project (Bowechop 2005a).

The trove of artifacts discovered around 1970 at the Ozette Village site (Subsection 3.10.3.1, Makah Archaeological Resources Connected with Whaling) and the more recent participation in the 1999 hunt has allowed residents to experience a connection to the past that would not otherwise have been possible (Braund and Associates 2007). The connection to their whaling ancestors and to the physical environment also renews Makah cultural and historical identity as whalers (Braund and Associates 2007). Renker (2012), discussing the importance of ceremonial activities and practices related to the whale hunt in enhancing the spirituality of Makah tribal members, wrote "…48.4 percent of HWS [Household Whaling Survey] III respondents share an opinion that a proper whale hunt is linked to the clean/sober, healthy lifestyle that hunters and their families must have, and that these are a critical part of the Makah Tribe's spiritual profile." She also referred to the Makah whale hunt as "a spiritual manifestation of the connection between Makah and their Creator." Renker (2012) later suggested that because the activity of whaling is so closely linked with physical, spiritual, and ceremonial obligations, the lack of whaling, especially after already being reintroduced to Makah people in recent years, is harmful to the spirituality of the Makah Tribe. Renker (2012) wrote the following:

> Now that a quarter of the Makah Tribe's members participate in ancient religious ceremonies, the lack of an active hunt makes it impossible for certain spiritual rituals to be performed. A spiritual void of this nature is devastating for Tribal members.

Dr. Renker's tribal survey found that 81 percent of the respondents consumed whale products (blubber, meat, or oil) obtained from the 1999 hunt, although 87 percent would like to have these products available in the future (Renker 2002). Sepez (2001) also quantified the consumption of whale products obtained from the whale taken during the 1999 hunt. The whale provided roughly 2,000 to 3,000 pounds (907 to 1,361 kg) of meat and 4,000 to 5,000 pounds (1,814 to 2,268 kg) of blubber, most of which was consumed at the community potlatch. Community households received approximately 1.8 pounds (0.81 kg) per capita distribution of blubber. Together with the estimated 0.55 pound (0.25 kg) of meat, Sepez calculated that the whale products consumed in 1999 equaled about 2.4 pounds (1.1 kg) per capita.

Members of other tribes attended the community's celebrations in 1999, witnessing the proceedings and sharing food—necessary components of traditional ceremonials by which a group establishes its status with other groups. When the Makah Tribal Council hosted the community potlatch after the 1999 hunt, the individual whalers received public recognition for their proficiency and commitment, and the Makah, as a tribal group, reaffirmed itself as people of wealth and history who maintain a relationship with the resources of their territory (Bowechop 2004). Within the cultural framework of the Makah people, no other activity besides the whale hunt and community feast is considered to embody such powerful metaphoric expression. Symbols are made meaningful through experience and action, and the whale is the Makah Tribe's symbol for cultural pride and independence. The Makah Tribe regarded the hunt as a means to revitalize and transfer its cultural knowledge associated with the activity.

The resumption of the hunt also provided the Makah Tribe with an opportunity to highlight the relationship with the related Nuu-chah-nulth people of British Columbia, Canada. Both engaged in hunting whales and practiced highly complex rituals believed to ensure the success of the hunt. Makah whalers traveled to Vancouver Island for several weeks before participating in the 1999 hunt to learn whaling techniques and traditions from knowledgeable Canadian elders. Some tribal members from Alaska and British Columbia attended the Makah Tribe's celebration of the 1999 kill (Braund and Associates 2007).

In 2006, 6 years after the last attempt by Makah whalers to hunt whales, the Makah Tribal Council commissioned a second whaling survey to gather information about residents' attitudes toward participation in whaling, including the actual hunt, ceremonial activities, and consumption and use of whale products. The 2006 survey was designed to follow the same methods used during the 2001 survey. The results of this survey are discussed in the Tribe's 2007 needs statement (Renker 2007).

Support for Makah whaling remained high in 2006, with 88.8 percent of respondents indicating that they supported the continuation of the Makah Tribe's efforts to hunt whales (Renker 2007). This percentage had decreased slightly since 2001, when 93.3 percent of respondents voiced support for the whaling efforts. However, the percentage of respondents opposing the effort to hunt whales increased by less than one percentage point, to 4.0 percent. The remaining respondents were unsure about whether whaling efforts should continue, citing reasons such as financial burdens on the village because of legal efforts, concerns about "racial animosity" that arose during and following the 1999 and 2000 hunts, and the effect of whaling efforts on fishing quotas and treaties.

Most respondents who supported whaling viewed the whaling efforts as being positive for the Makah Tribe (Renker 2007). They attributed the whaling efforts with helping to restore or maintain heritage and ceremonies, as well as increasing tribal unity and encouraging healthy living among youth.

A high percentage of respondents (80.3 percent) continued to desire whale products for consumption or use. Respondents also expressed interest in learning more about the butchering, processing, and use of whale products (Renker 2007).

One area in which positive responses increased significantly from 2001 to 2006 was in regard to participation in ceremonial activities (Renker 2007). The percentage of respondents participating in ceremonial activities rose from 25.8 percent in 2001 to 41.5 percent in 2006. Regarding this outcome, Dr. Renker stated the following:

> The HWS II (Household Whaling Survey II) attests that the ceremonial aspects of the Makah whale hunt are once again becoming a standard part of the life of a majority of Tribal members, even when the Tribe is prevented from hunting because of outside legal struggles (Renker 2007).

Dr. Renker conducted yet another survey in 2011, which is reported in the Makah Tribe's needs statement (Renker 2012). The results of that survey were similar to previous surveys and are summarized in Table 3-37.

3.10.3.5.2 Makah Subsistence Consumption

An overview and analysis of contemporary Makah subsistence foraging, focusing on hunting, fishing, and shellfish collecting, indicated that the Makah people continue to rely on their U&A resource harvesting areas for a significant portion of their diet (Sepez 2001; Etnier and Sepez 2008). The survey by Sepez (2001) documented the use of approximately 80 species, with most of the diversity concentrated in the marine resources. While the author of the study was reluctant to rank the resources in terms of importance, largely because of the inability of statistics to discern nonquantifiable qualities of resources that make them important, harvesting and consumption patterns did emerge from the data.

Using household surveys from a randomly selected sample as the basis for her analysis, Sepez (2001) found that 99 percent of the households indicated some type of consumption of local resources for subsistence purposes during the study period. Fully 71 percent of households engaged in harvesting resources, while 94 percent received resources harvested by another household, indicating that sharing resources was a common practice among tribal members. Table 3-39 presents the percent of households using local resources obtained directly or through exchange during the 1997 and 1998 study period.

Table 3-39. Percentage of households using local resources during 1997 to 1998.

Food Resource	Percentage of Households (%)
Halibut, salmon, clams, crab	76 – 100
Mussels, deer, elk, gooseneck barnacles, seal, salmon eggs, barnacles	51 – 75
Steelhead, lingcod, olive shells, chitons, octopus, rockfish, smelt, blackcod, herring eggs, grouse	26 – 50
Urchins, lingcod eggs, local cow, petrale sole, trout, tuna, bear, scallop, oysters, sole/flatfish, sea cucumber,	1 – 25

squid, sturgeon, true cod, shrimp, rabbits, abalone, duck, pigeon, skate, sea lion, small gastropods, wolf eel	
Goose, porpoise, sea anemone, sea otter, sea turtle, shark, whale[1]	

[1] Resources currently used but not included in the survey.
Source: Sepez (2001).

Table 3-39 represents reported local use of the resource. The survey found that the widest range of households use marine resources. Further analysis indicated that fish accounted for 55 percent of meat and seafoods in the Makah diet, a figure that highlights the cultural significance of marine resources when compared to the average 7 percent of meat and seafoods that occupy the diet of other Americans (Sepez 2001).

Sepez (2001) concluded in her study of Makah subsistence that the tribal members' preference for fish and other resources produced through subsistence channels was specific to the type of food being chosen, but that several social and economic factors influenced the role of subsistence in the contemporary tribal lifestyle:

- Perception of subsistence foods as free for the taking
- Link with cultural identity
- Perception that seafoods taken from other places are unclean or mistreated
- Pleasure in undertaking subsistence activities
- Sense of connection to the local environment and to those who used the resource in the past

Makah members articulated similar statements when asked about their desire for whale products (Renker 2002). According to Braund and Associates (2007), no food is more symbolic of the traditional Makah culture than whale, for its consumption serves as a metaphoric reminder of the wealth, history, and social structure of the community.

On July 16, 1995, a female gray whale was found entangled and drowned in a tribal marine set net salmon fishery in the Strait of Juan de Fuca outside of Neah Bay. NMFS biologists and the tribal fisherman who discovered the whale removed the carcass from the net, and the Tribe butchered the whale for subsistence use before the meat spoiled. The use of the female gray whale for subsistence represents the first time in recent times the Makah Tribe sought to exercise its treaty right to consume whale products (NMFS 1995).

The Tribe's 2012 needs statement provides a detailed account of current health issues present within the Makah's and other American Indians' communities and discusses the potential nutritional benefits of consuming whale products, suggesting that a return to eating whale could lead to better overall health of Makah tribal members, both physically and spiritually (Renker 2012).

Sharing food in contemporary Makah society, Sepez (2001) observes, is "an accepted and expected aspect of subsistence" and recognizes a traditional obligation for generosity, particularly extended to those in need. Within a complex system of reciprocity and redistribution, sharing bolsters one's status within the community and serves to enact one's tribal identity. Table 3-40 charts the percentage of Makah harvesters who shared part of their gains during the 1997 to 1998 study year. Seal meat and oil emerged as the resources most likely to be distributed during the time of the survey, with all hunters of seal reporting distribution of the meat or rendered oil. Sepez (2001) notes that the resource column lists items in descending order of percent of harvesters giving some portion away.

Table 3-40. Percentage of Harvesters of Each Resource Who Gave Away Some Portion, 1997-1998

Resource	Percentage of Harvesters (%)
Seal	100
Halibut, black cod, smelt, octopus, clams, salmon, gooseneck barnacles, fish eggs	99 – 67
Crab, elk, mussels, deer, steelhead, scallops, chitons, ling cod	66 – 34
Olive shells, barnacles, rockfish, grouse, urchins	33 – 1
Trout	0

Source: Sepez (2001).

3.10.3.5.3 Symbolic Expression of Whaling

In both traditional and contemporary Makah society, depictions of the whale and the whale hunt are very meaningful. These symbols were once used only on the property of elite members of Makah or Nuu-chah-nulth society and, therefore, appeared on items such as dance screens or curtains narrated visually with images celebrating the lineage's history, memorial posts to commemorate a chief's greatness, twined whalers' hats decorated with motifs of whaling scenes, wooden images used in ceremonials, and small personal amulets or charms imbued with spiritual power (Black 1999). Chiefs have also tattooed whales upon their chests (Koppert 1930). The traditional view is focused primarily on the relationship between humans and whales, the transformation of the whale into wealth, and the physical features underpinning the metaphors of strength, courage, and generosity.

Ethnomusicologist Frances Densmore photographed a dance curtain containing the large image of a thunderbird carrying a whale, along with other images, hanging in front of one of the walls of the Neah Bay community hall where dances were performed for Makah Days in 1926 (Densmore

1939). James Swan, a New England pioneer who lived among the Makah in the 1860s, was impressed by a painting of a thunderbird on a chief's house at Neah Bay. He recorded the Makah Indians' description of thunderbird as a supernatural giant who killed whales with lightning fish tied around his waist, then carried them back to the mountains to eat (Quimby 1970). According to Janine Bowechop, current Executive Director of the Makah Cultural Research Center, a commonly held Makah belief is that during a time of starvation, Thunderbird brought a whale to the Makah people to eat and then showed them how to hunt whales. The symbolic use of whales within contemporary Makah society continues to be important (as Dr. Renker observed in the Makah Tribe's needs statements submitted to the IWC in 2002, 2007, and 2012).

Statements made by Makah participants after the 1999 hunt suggest that the contemporary whalers' association with the whale retains some of the qualities described in the ethnographic literature (Tweedie 2002), but the symbolic use of whales and whaling has extended beyond an association of a chief with his wealth to that of the community as a whole. Symbols of this traditional discourse that were rooted in the practice and experience of the elite now inform the contemporary model of tribal self-sufficiency. The cessation of the whale hunt and its associated privately-owned rituals and ceremonials, along with changes in the traditional Makah social organization, resulted in lessening the direct relationship between the whale and the whalers. Subsequent emergence of the whale as a secular image nevertheless represented the loss of a former way of life, one in which physical and mental strength brought glory and wealth to the chiefs and, thus, to the community at large. Whale hunting in the current discourse possesses symbolic properties and qualities that make it a potent vehicle for the strength of Makah identity, sovereignty, and cultural revitalization. Hence, resumption of the hunt, as Janine Bowechop (2004) concluded in her essay, *Contemporary Makah Whaling*, was necessary to help her people become healthier and stronger and to close the gap between the past and the present.

3.11 Noise

3.11.1 Introduction

The following section documents noise-related issues pertaining to the proposed Makah whale hunts. Included are discussions of relevant noise-related policies and jurisdictions, sensitive noise receptors in the human environment, and background noise conditions near the project area. Key parameters for analysis include ambient noise levels in the project area and the distance between sensitive receptors and noise-producing project activities. Refer to Subsection 3.5.3.3, Sensitivity of Wildlife to Noise and Other Disturbance, for a discussion of the potential for disturbance to wildlife and key wildlife use areas, such as seabird rookeries and haulouts for marine mammals.

Noise is generally defined as unwanted sound (EPA 1971). Sound level is expressed in units called decibels (dB). The dB scale quantifies sound levels relative to a reference point of 0 dB, which is defined as the threshold of human hearing and is roughly equivalent to the sound of a mosquito flying 10 feet (3 m) away. [71] To account for the large range of sound pressures the ear can detect, the dB scale is logarithmic. A 10-dB increase in sound level is perceived as a doubling of loudness. The ear is not equally sensitive to sound at all frequencies or musical pitches; two sounds of equal intensity (i.e., with equal dB values) may be perceived as having different loudness levels if they have different frequencies. Very high-pitched whistles demonstrate the relative sensitivity of the human ear (as compared to the ears of other species) at certain frequencies; dogs readily hear these sounds, but they are nearly inaudible to humans.

Sound frequency is measured in terms of cycles per second, or hertz (Hz). The human ear is most sensitive to sounds in the frequency range of 1,000 to 5,000 Hz. To account for this sensitivity, a process called frequency weighting is often used in sound descriptions. The most widely used system is A-weighting, in which noise in the frequencies of maximum human sensitivity factors more heavily than other frequencies in determining the overall noise level. Decibel values in this system are commonly denoted as dBA. Most noise regulations use the A-weighted scale to define acceptable limits for noise levels. Refer to Subsection 3.11.3.2.2, for information specific to marine noise and Subsection 3.5.3.3.4, Marine Mammals and Underwater Noise, for a discussion of the frequencies at which the ears of marine mammals are most sensitive.

3.11.2 Regulatory Overview

The OCNMS management plan provides no specific direction regarding noise (NOAA 1993). Control of noise is, however, consistent with Sanctuary goals of resource protection and compatible public use. FAA regulations prohibit the operation of motorized aircraft less than 2,000 feet (610 m) above the Sanctuary and within one nautical mile (1.9 km) of the shoreline. In addition, USFWS recommends a 200-yard (183-m) exclusionary zone around islands in the Washington Island National Wildlife Refuges to avoid the flushing of nesting seabirds by boat and other vessel traffic.

The Olympic National Park, under federal jurisdiction, is managed consistent with enabling federal legislation to ". . . conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means

[71] Acoustic scientists use different reference pressures for air and water, resulting in underwater readings that are higher than the same energy source measured in air (Bradley and Stern 2008).

as will leave them unimpaired for the enjoyment of future generations" (National Park Service Organic Act, 16 USC 1). The control of noise by park authorities is relevant to leaving the natural and cultural resources and values of the park unimpaired. Noise control is particularly germane in portions of the park designated as wilderness; this includes the park area along the Pacific Ocean coastline. Specific regulations prohibit the operation of "motorized equipment or machinery in a manner that exceeds a noise level of 60 dB measured on the A-weighted scale at 50 feet (15 m); or, if below that level, makes noise which is unreasonable, considering the nature and purpose for which the area was established" (36 CFR 2.12). The Wilderness Act does not establish noise regulations, but it implies that noise should be minimized in designated Wilderness areas to achieve "outstanding opportunities for solitude" (Public Law 88-577).

State of Washington noise regulations in WAC 173-60-040 are in effect statewide. Clallam County has no separate noise regulations and is subject to state standards. Maximum permissible environmental noise levels vary, depending on the land use categories of the noise source and the receiving property. Maximum permissible noise levels range from 55 to 60 dBA for residential properties, 57 to 65 dBA for commercial uses, and 60 to 70 dBA for industrial areas.
WAC 173-60-050 specifies exemptions from maximum permissible noise levels in certain cases, including the following:

- Sounds created by the discharge of firearms on authorized shooting ranges (exemption applies only from 7:00 a.m. to 10:00 p.m.)
- Sounds originating from forest harvesting and silvicultural activity (exemption does not apply near residential and recreational areas from 10:00 p.m. to 7:00 a.m.)
- Sounds originating from aircraft in flight
- Sounds created by emergency equipment and work necessary in the interests of law enforcement or for health, safety, or welfare of the community
- Sounds created by safety and protective devices where noise suppression would defeat the intent of the device or is not economically feasible
- Sounds created by the discharge of firearms in the course of hunting

3.11.3 Existing Conditions

The following subsections identify sensitive noise receptors in the project area, followed by a discussion of existing noise levels in the two media of noise transmission (air and water) in the project area. The discussion in this section focuses on sensitive noise receptors in the human environment. The sensitivity of wildlife to noise and other disturbance is discussed in Subsection 3.5.3.3, Sensitivity of Wildlife to Noise and Other Disturbance.

3.11.3.1 Sensitive Noise Receptors

Sensitive noise receptors include facilities and activities for which excessive noise may cause annoyance, increased stress, loss of business, or other adverse effects. Examples of sensitive receptors include residential areas, hospitals, schools, performance spaces, and businesses. Open space is also noise-sensitive if excessive noise would adversely affect potential recreational use of the space. Nearly all portions of the project area sustain residential or recreational uses, with maximum permissible noise levels between 55 and 60 dBA. Businesses in Neah Bay and the offices of the Makah Tribal Center meet the criteria of commercial property, while timber harvest areas would be considered industrial sites.

3.11.3.1.1 Olympic Coast National Marine Sanctuary

Staff at OCNMS have identified noise as a management issue for the Sanctuary, particularly with regard to disturbance of humans and wildlife (Parrish et al. 2005). Noise associated with aircraft overflights has been identified as a primary concern, but the extent of overflights within the Sanctuary is not known. It is also unclear whether, or how much, disturbance to Sanctuary-protected wildlife results from overflights (Parrish et al. 2005). OCNMS staff report that overflights occur primarily during the summer and that visitor complaints are rare (Parrish et al. 2005).

3.11.3.1.2 Makah Reservation

Sensitive noise receptors on the reservation occur primarily along trails and shoreline areas used for recreation by residents and tourists. Cape Flattery is a Makah Tribe designated wilderness area. South of Cape Flattery, the Pacific coastline is largely wooded; some inland areas are managed for timber harvest. There is little or no human settlement north of Wa'atch Point. The Makah Tribal Center on the north side of the Wa'atch River supports residential, administrative, and commercial uses. Areas farther south include low-density residential development, with several roads near the shoreline. South of Anderson Point to the Olympic National Park boundary, the shoreline is characterized by rocky bluffs and small pocket beaches. Primitive roads and trails provide recreational access.

3.11.3.1.3 Olympic National Park

Within the Olympic National Park, the shoreline is a designated wilderness area accessible only by foot. In most portions of this area, the total number of users is restricted by a wilderness permit system. A trail and boardwalk connect the parking area at Lake Ozette to the shoreline at Cape Alava and Sand Point. The number of visitors to this area is restricted only by the capacity of the parking lot. Because the coastal shoreline portion of the park is a designated wilderness area, this entire area of the park is a sensitive noise receptor.

3.11.3.2 Existing Noise Levels

The following sections describe the baseline conditions of the acoustic environment in the project area, including atmospheric and underwater noise. Particular attention is given to sources of noise associated with a whale hunt, namely, aircraft (e.g., news helicopters and other aircraft observing the hunt and associated activities), and vessel traffic. Subsection 3.5.3.3, Sensitivity of Wildlife to Noise and Other Disturbance, addresses existing levels of noise and disturbance at marine mammal haulouts and seabird colonies in the project area. Where available, information from the previous hunts is included to provide a background for subsequent analysis of the potential effects of the alternatives.

3.11.3.2.1 <u>Atmospheric Noise</u>

The primary sources of ambient sound in the area are natural, mostly wind and waves. Natural quiet found in wilderness recreation areas is characterized by the absence of human-made noise, which creates conditions that allow visitors to enjoy the intermittent sounds of animals, wind, water, and other natural sources.

In addition to natural sounds, human activities are a source of noise in the project area. Near Cape Flattery, people hear the Tatoosh Island foghorn. The acoustic environment in the area of the Makah Tribal Center is likely characteristic of residential and small town centers, with ambient noise levels ranging from 50 to 65 dBA. Settings where people congregate, such as commercial areas, school playgrounds, and sports fields, are additional local sources of noise. Throughout the area, the most pervasive noise source is traffic on local roads. Noise from individual automobiles and trucks can range from 70 to 90 dBA. Sirens of emergency vehicles are likely the loudest noise source; they produce noise at approximately 130 dBA at 100 feet (31 m). The occurrence of such noise is infrequent, irregular, and primarily affects areas next to arterial roads. Noise sources associated with active logging operations include chain saws (110 dBA) and other equipment (80 to 110 dBA). Most timber harvest units associated with the Makah logging operations are located away from residences to avoid noise impacts. However, the Makah Forest Management Plan (Makah Tribe 1999) does not mention noise as an issue to be addressed during logging operations.

Another source of noise in the area is airplane traffic, particularly near the three airports in western Clallam County (Subsection 3.13.3.3, Air Traffic). The most heavily used airport in the area is the Forks Municipal Airport, which receives an average of approximately 40 operations every day (Federal Aviation Administration 2012). Noise from aircraft taking off and landing is unlikely to be a major issue in the U&A, however, because the airport is more than 15 miles (24 km) away from the southern extreme of the U&A. The Quillayute Airport, which has fewer than 20 takeoffs and landings per day, on average, is approximately 9 miles (15 km) away from the southern extreme of the U&A. The Sekiu Airport, which averages approximately 2 takeoffs and landings per day, is immediately adjacent to the portion of the U&A within the Strait of Juan de Fuca and approximately 20 miles (32 km) from the Pacific Ocean portion of the U&A.

In their study of overflights in west coast National Marine Sanctuaries, Parrish et al. (2005) gathered information about small, private, general aviation airplanes and helicopters. Such aircraft, typically flown by private pilots for sightseeing purposes, have the potential to disturb humans and wildlife by flying low over Sanctuary waters (Parrish et al. 2005). Other types of aircraft that may occur in the area include regularly scheduled tourist flights, such as those provided by National Park tour concessionaires, and Sanctuary-permitted research flights. Military and Coast Guard flights also occur over the area (Parrish et al. 2005). During field studies at Tatoosh Island in the summer months (June, July, and August) of 1997 through 2003, researchers from the University of Washington documented 106 instances in which aircraft violated overflight regulations by flying below 2,000 feet (610 m) within 1 mile (1.6 km) of shore in the Sanctuary. The frequency with which violations occurred ranged from approximately 0.1 to 0.75 per hour (Galasso 2005).

During the previous whale hunts, media helicopters and other aircraft likely created elevated noise levels. The Coast Guard used helicopters to enforce the exclusion zone around tribal vessels actively engaged in the hunt (Subsection 3.14.3.1, Coast Guard). During the successful hunt, three television news helicopters were present throughout the day (U.S. Coast Guard 1999a). No information is available to document noise levels associated with those sources. OCNMS regulations that require motorized aircraft to fly at least 2,000 feet (610 m) above certain portions of the Sanctuary probably limited the effects of aircraft noise on residents and recreational users near the hunt. Only one instance of an aircraft failing to observe these regulations was reported during the previous hunts (Subsection 3.13.3.3, Air Traffic).

Other noise sources associated with the previous hunt included marine vessels used by the whale hunters, protesters, and law enforcement personnel (Subsection 3.13.3.2.3, Marine Traffic During the Previous Hunt). Most hunt-related activities took place well offshore, and vessel noise was likely inaudible to sensitive receptors in Olympic National Park and OCNMS. To avoid disturbance to resting and breeding birds and marine mammals, the Makah gray whale management plan prohibited the initial strike of a whale within 200 yards (183 m) of Tatoosh Island or White Rock between May and September. All three strike attempts occurred 1 to 2 miles (1.6 to 3.2 km) offshore (NMFS 1999). Increased vessel traffic was likely audible to local residents near the marina and Coast Guard station at Neah Bay and at Clallam Bay, where most protest vessels moored.

3.11.3.2.2 Marine Noise

Marine environments can be noisy. Natural noise sources include wind, waves, precipitation, earthquakes, lightning strikes, and surf. Biological sounds include whale songs, dolphin clicks, fish vocalizations, and the clicking of crustaceans (Urick 1983; National Research Council 2003). Noise sources associated with human activities include commercial shipping, geophysical surveys, oil drilling and production, dredging and construction, sonar systems, oceanographic research, acoustic deterrent and harassment devices, and power turbines (National Research Council 2003; Nowacek et al. 2007; Hildebrand 2009).

Open ocean ambient noise levels estimated from sound data collected in portions of the South Pacific with relatively low levels of human activity suggest that low-frequency sound levels range from 40 to 50 dB (relative to 1 microPascal at 3.3 feet (1 m)[72]) in calm seas (Cato and McCauley 2002; National Research Council 2003). In areas of the Pacific Ocean where commercial shipping is more prevalent, measured ambient sound levels have ranged between 80 and 90 dB (Andrew et al. 2002; McDonald 2006). A variety of natural processes increases these levels: precipitation on the ocean surface contributes sound levels up to 35 dB across a broad range of frequencies (Nystuen and Farmer 1987); an increase in wind speed from 5 to 10 knots causes a 5-dB increase in ambient ocean noise across most frequencies. The highest noise levels generally occur in nearshore areas where the sound of surf can increase underwater noise levels by more than 20 dB a few hundred yards/meters outside the surf zone across a frequency band from 10 to 10,000 Hz (Wilson et al. 1985; National Research Council 2003).

Among noise sources associated with human activity, surface shipping is widely considered the most widespread source of low-frequency (5 to 1,000 Hz) noise in the oceans (Wenz 1962; National Research Council 2003; Hildebrand 2009). At frequencies below approximately 200 Hz, commercial shipping is the primary source of ocean ambient noise. While natural forces (e.g., wind, rain, waves) are the primary factor determining ambient noise levels in higher frequency ranges,

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[72] Relative sound intensities (i.e., decibel values) in water are not directly comparable to relative sound intensities in air. This is primarily because the reference intensities used to compute sound intensity are different in water and air. A standard reference intensity must always be used when comparing relative intensities to one another. For underwater sound, the intensity of a sound wave with a pressure of 1 microPascal at 3.3 feet (1 m) from the source point is used as the reference intensity. In air, however, the reference intensity is 20 microPascals at 3.3 feet (1 m).

there is virtually no correlation between local sea state and ambient noise at lower frequencies (Hildebrand 2009). Noise levels in the marine environment have increased since the mid-twentieth century, likely in part because of increases in shipping traffic (National Research Council 2003). Andrew et al. (2002) collected ocean ambient sound data from 1994 to 2001 using a receiver on the continental slope off Point Sur, California. These data were compared to measurements made from 1963 to 1965 by an identical receiver. The data demonstrated an increase in ambient noise over the 33-year period of approximately 10 dB in the frequency range of 20 to 80 Hz, primarily because of commercial shipping; there were also increases as large as 9 dB in the frequency ranges 100 Hz up to 400 Hz, for which the cause was less obvious (Andrew et al. 2002). McDonald (2006) compared data sets from 1964 to 1966 and 2003 to 2004 for continuous measurements west of San Nicolas Island, California, and found an increase in ambient noise levels of 10 to 12 dB at 30 to 50 Hz.

Puget Sound experiences a concentration of commercial shipping in and out of United States ports, with the ports of Seattle and Tacoma collectively representing 9 percent of 20-foot-equivalent (6-meter-equivalent) container traffic in 2010 (United States Army Corps of Engineers 2011). The OCNMS has designated a large portion of the project area as an area to be avoided. Under this voluntary ship traffic management program, vessels are advised to stay clear of this area if they carry cargoes of oil or hazardous materials or if they exceed 400 gross tons (Subsection 3.1.1.1.3, Current Issues, Area to be Avoided, for more information). Veirs and Veirs (2006) found that the broadband sound field (i.e., 100 to 15,000 Hz) in Puget Sound near Haro Strait was dominated by noise from large vessels. With high source levels and long pulse lengths, military sonar signals (e.g., from low-frequency active sonar systems) are also likely a major source of low-frequency ocean noise over wide areas (Hildebrand 2009).

Owing to the physics of underwater sound propagation, small vessels do not contribute substantially to ocean ambient noise on a global scale, but they may be important local sound sources in coastal areas (Hildebrand 2009). In Haro Strait, Veirs and Veirs (2006) found that small vessels raised overall sound levels about as much as commercial ships (15 to 20 dB), but for shorter periods and at higher frequencies (10,000 to 20,000 Hz). In 2011, approximately 263,000 motor boats were registered[73] in Washington State (Washington Department of Licensing 2012), with the majority likely operating near heavily populated areas surrounding Puget Sound. Scientific vessels, which can operate in a given area for several days at a time, generate noise at

[73] In Washington, all boats 16 feet (4.9 m) or more in length or with 10 or more horsepower are required to be registered; registration is not required for boats under those thresholds not used on navigable waters.

levels ranging from 160 to 190 dB at the source (National Research Council 2003). Received sound levels for whale-watching boats measured at approximately 299 feet (91 m) ranged up to 127 dB across a broad band of frequencies (315 to 2,500 Hz) (Au and Green 2000). Erbe (2002) documented increased sound levels for high-speed operation. Small powerboats have peak sound intensities of 145 to 150 dB in the 350 to 1,200 Hz band (Barlett and Wilson 2002). Fishing vessels also have moderate sound levels. Vessel traffic associated with commercial and recreational fishing in the project area is heaviest and, therefore, probably loudest, from May to August (Subsection 3.13.3.2, Marine Vessel Traffic). In the Haro Strait study area, the prevalence of small vessels contributed to average sound levels during summer days that were 3 dB higher than during summer nights, winter days, or winter nights (Veirs and Veirs 2006).

3.12 Aesthetics

3.12.1 Introduction

This section discusses aesthetics as visual resources associated with the project area, a place where the Pacific Ocean, beaches, rocky tidepools and headlands, and adjacent forested wilderness meet. In the designation documentation for the OCNMS, Congress described the area as “one of the more dramatic natural wonders of the coastal United States, paralleling the majestic splendor of such terrestrial counterparts as Yosemite National Park and the Grand Tetons,” (50 Fed. Reg. 24586, 24604, May 11, 1994). Key visual resources in the project area include natural landscapes and seascapes, wildlife, and tangible cultural resources and historic artifacts.

Peoples’ opportunities to view past and proposed Makah whale-hunting activities in the project area are described by detailing access points where hunting and landing of a whale might be seen. Annual numbers of visitors and primary seasons of viewing are also described. Because whale hunts would take place offshore, and because the Makah practice exercises in 1998 and hunts in 1999 and 2000 were highly covered and televised events, most opportunities for viewing the hunt and hunt-related activities would occur through the media, including newspapers and television. For this reason, this section also describes media coverage of the previous hunts, along with public response to that coverage.

3.12.2 Regulatory Overview

As noted in Subsection 3.1, Geographically Based Management in the Project Area, several federal and tribal managed areas occur and overlap within the project area. These include the OCNMS, the Washington Islands National Wildlife Refuges, the coastal strip of the Olympic National Park, and the Makah and Ozette Indian Reservations (Figure 3-1). Because of their proximity to the project area, these management areas provide possible vantage points to whaling activities under each of the alternatives. The laws and regulations governing the management of these areas include recognition of the importance of aesthetic resources. In some cases, specific policy or management documents expand upon the aesthetic qualities that lend importance or value to the managed areas.

The National Marine Sanctuary Act, and NOAA's implementing regulations under which the OCNMS is designated and managed, include aesthetic values as important to the sanctuary concept. Sanctuary resources are defined as "any living or nonliving resource that contributes to the conservation, recreational, ecological, historical, educational, cultural, archeological, scientific, or aesthetic value of the Sanctuary," (16 USC 1432(8), 50 CFR 922.3). Subsection 3.1.1.1, Olympic Coast National Marine Sanctuary, describes the multiple-use nature of the Sanctuary, NOAA's regulations establishing prohibitions on certain uses of the Sanctuary, and the biological and historic characteristics of the Sanctuary that give it particular value as identified by the OCNMS designation document. Aesthetic resources of the Sanctuary that give it particular value include its remoteness, its undeveloped character, and its marine life, as well as tangible, historical resources including Indian village sites, ancient canoe runs, petroglyphs, and Indian artifacts (59 Fed. Reg. 24586, 24604, May 11, 1994; NOAA 1993).

The National Park Service Organic Act, governing the management of all national parks including the Olympic National Park, states that the fundamental purpose of national parks is "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations" (16 USC 1). The National Park Service has not developed a visual resource policy or management system for public lands under its jurisdiction; however, the overriding management purpose in a park is preservation of all significant resources, including the scenery (National Park Service 1996). Both the National Park Service and Ecology manage the aesthetics of the shoreline under federally-granted Coastal Zone Management Act authority. The Coastal Zone Management Act identifies beaches as aesthetic resources of the nation (16 USC 1451(b)). Washington State's Shoreline Management Act establishes a program to coordinate the protection and development of the state's shoreline, preserving to the greatest extent possible the public's opportunity to enjoy the physical and aesthetic qualities of state natural shorelines (RCW 90.58.020). The Makah Tribe also has a coastal zone management plan for reservation shorelines.

Approximately 70 percent of Olympic National Park's coastal strip, including 36,000 acres mostly north of the Hoh River, is designated as wilderness (National Park Service 2008). Under the Wilderness Act of 1964 (Public Law 88-577), wilderness areas are managed for the "preservation of their wilderness character" for current and future generations of Americans (16 USC 1131). Both natural and cultural resources are contributing elements to the Olympic National Park Wilderness (National Park Service 2008). The principles applied to federal wilderness areas also apply to management of the Washington National Wildlife Refuges, which are all designated as wilderness areas, except for Destruction Island in the Quillayute Needles National Wildlife Refuge. Other protective regulations are described in Subsection 3.1.1.2, Washington Islands National Wildlife Refuges. Reservation lands along the shoreline around Cape Flattery are also designated wilderness.

Living marine resources within the project area, including, but not limited to, whales and other marine mammals, are also protected by federal and state statute and regulation as aesthetic resources. The Whaling Convention Act, for instance, includes the finding that whales are a unique marine resource of great aesthetic and scientific interest to mankind and notes that the protection and conservation of whales are of particular interest to citizens of the United States (16 USC 916 note, Public Law 96-60, August 15, 1979). The MMPA also includes the Congressional finding that "marine mammals have proven themselves to be resources of great international significance, aesthetic and recreational as well as economic" (16 USC 1361(6)).

3.12.3 Existing Conditions

The following sections describe the key visual resources in the project area, vantage points into the Makah U&A, and estimates of the number of visitors to these areas every year. Following the discussion of potential direct viewing opportunities is a summary of media coverage of previous hunts.

3.12.3.1 Visual Resources in the Project Area

The sea stacks, pillars, and islands that make up the Washington Islands National Wildlife Refuges within the OCNMS are a visual resource of statewide significance, representing the remote and rugged nature of the Olympic Peninsula's coastline (USFWS 2007). The islands rise out of the ocean in a variety of shapes and forms and are varying distances from the shoreline; formations in the foreground often appear as flat-topped cliffs rising out of the water, while formations in the background appear as clusters of often fog-shrouded stacks (USFWS 2007). Many of the islands have vegetation, including small trees and shrubs, particularly the larger islands (such as Ozette Island). Other smaller islands have extensive steep grassy slopes or vegetated ledges (USFWS 2007). The islands also provide views of hauled-out sea lions and seals, migrating and feeding whales, and sea otters, among other species (Subsection 3.5.3.1.2, Common Species off Washington Coast). Many species of seabirds are visible in the marine waters, off the coastal headlands and islands, and along the shore, including raptors, gulls, petrels, cormorants, auks, murrelets, guillemots, common murres, auklets, and puffins, among others (Subsection 3.5.3.2.1, ESA-listed Species, and Subsection 3.5.3.2.2, Non-listed Marine Birds and Their Associated Habitats, for more information on marine birds that occur in the project area).

In the Olympic National Park, more than 650 archaeological sites document 10,000 years of human occupation, while historic sites reveal clues about the 200-year history of exploration, homesteading, and community development in the Pacific Northwest (National Park Service 2008). Maritime archaeological sites include stratified shell midden deposits and petroglyph sites and represent one of the Olympic National Park's most important and threatened classes of archaeological resources. Threats include coastal erosion and visitor use. Past mitigation at these areas has included excavation, bank stabilization, and revegetation (National Park Service 2008). Public education and interpretation, coupled with increased monitoring and ranger patrols, aims to curb the impacts of visitation and tidal debris on the coastal petroglyph sites, particularly at Wedding Rocks, a site on the beach near Cape Alava (National Park Service 2008).

3.12.3.2 Vantage Points and Viewing Opportunities

Visitors can view the portion of the Makah U&A in the Strait of Juan de Fuca by vehicle at several locations along Highway 112, including the towns of Sekiu, Clallam Bay, and Neah Bay. In contrast, vehicle-based viewing opportunities for the Pacific coastal portion of the U&A are limited to a few sites on the Makah Reservation, mostly in the Tsoo-Yess and Hobuck Beach area of Makah Bay. No roadways offer views of the southern portion of the Makah U&A. The La Push/Rialto Beach area is approximately 8 miles (13 km) south of the Makah U&A. The only scenic driving opportunity along the coast of the Olympic Peninsula is an 8-mile (13-km) stretch of United States Highway 101 in the Kalaloch area, which is more than 30 miles (48 km) south of the Makah U&A (National Park Service 2008).

Most of the land-based viewing access in the project area is from hiking trails and beaches (where camping opportunities exist), including the Cape Flattery Trail and Hobuck and Tsoo-Yess beaches on the Makah Reservation. The Olympic National Park also provides hiking and backpacking access to 50 miles (81 km) of beaches with views of the islands. The Ozette/Shi Shi portion of the Olympic National Park, including the Point of Arches, is the most visible and photographed place in the Olympic National Park coastal strip. Many visitors also access the beach for 2.9 miles (4.7 km) between the Cape Alava and Sand Point trail heads (National Park Service 2008).

NOAA (2006) reports that more than 3 million people visit the north Washington coast every year, drawn by the beautiful scenery and the pristine wilderness, as well as opportunities to view wildlife and challenge themselves in a natural environment. Similarly, the Olympic National Park attracted an average of 3.0 million visitors per year between 2006 and 2010, with more than half of the visits occurring during the months of July through September and an additional 25 percent of the visits occurring during the months of March through June (Clallam County Economic Development Council 2011). Part of the Makah U&A is visible to OCNMS visitors.

Total annual overnight visitation on the northern coastal portion of the park was 29,379 camper-nights in 2010 and 31,790 camper-nights in 2011 (B. Bell, Olympic National Park, pers. comm., June 30, 2012). Although these data do not directly reflect day use, they serve as an indicator of seasonal variability in visitation rates. For comparison, the General Management Plan and Environmental Impact Statement for Olympic National Park reported 59,439 total recreation visits to the Ozette district (which includes the northern coastal portion of the park) in 2004. Summer is the peak period for overnight visitation; more than 50 percent of the total camper-nights in 2011 occurred during July and August. In 2011, 1,344 camper-nights (4.2 percent of the annual total) occurred in April, and 2,288 camper nights (7.2 percent of the annual total) occurred in May (B. Bell, Olympic National Park, pers. comm., June 30, 2012). These values average to 45 (April) and 74 (May) campers per night along the approximately 27-mile (44-km) coastal stretch of Olympic National Park that includes the Makah U&A, or roughly 2 to 3 persons per mile of beach per night. Hiking and boating trips provide viewing opportunities to the Makah U&A.

On average, more than 16,000 people visited the Cape Flattery Trail each year from 2005 through 2011 (J. Bowechop, Makah Cultural and Research Center Director, pers. comm., July 11, 2012). Most such visits occur during the summer months. In 2004, a Makah interpreter recorded an average of 169 visitors per day in July, 189 visitors per day in August, and 93 visitors per day for September (Bowechop 2005b). Based on those averages, more than 13,000 people visited the Cape Flattery Trail during the summer months of 2004. If the total number of visitors in 2004 was similar to the average from 2005 through 2011, then more than 80 percent of the people who visited the trail did so during the months of July, August, or September.

Another driver of visitation to Neah Bay is the celebration of Makah Days, which is attended by approximately 8,000 people each year (Preston 1998) (Subsection 3.10.3.5, Contemporary Makah

Society). This celebration of Makah identity features a parade, street fair, canoe races, children's races, traditional dancing, a salmon bake, and fireworks (Tizon 1998a).

Previous authorized hunts in 1999 and 2000 occurred within the Makah U&A and OCNMS, along and adjacent to the coastal area of the Olympic National Park. Whale hunting activities were visible from Ozette Island, Cape Alava, and Sand Point to Father and Son Rock, the Point of the Arches, and Spike Rock near the Ozette Reservation and Shi Shi Beach (Gosho 1999) (Subsection 1.4.2, Summary of Recent Makah Whaling — 1998 through 2007, for more information about the locations of the 1999 hunt). People on trails and beach vantage points of the Olympic National Park may have viewed the hunts, including the May 17, 1999 killing of a gray whale. The possibility that some viewers were caught unaware is extremely unlikely because May is not a peak visitor month, the hunts were well-advertised in the media, and the weather conditions were poor (Gosho 1999) at least some of the time. People on the shores of Neah Bay on the Makah Reservation could view the whale being towed to shore and flensed. These activities were also visible to protesters, enforcement personnel, and tribal members in vessels surrounding the hunts. Most of those viewing the whaling activities on the shore within the Makah Reservation were tribal members who supported the hunt and had favorable reactions. As reported by the *Seattle Times*, Makah tribal members in Neah Bay considered the visual effects of the hunt as ". . . cause for celebration, a triumphant embrace of tradition and heritage, a culture's central symbol giving itself up for the kill" (Sorensen 1999).

During the May 1999 whale hunts, news reports indicate that vehicular access to State Route 112 paralleling the Strait of Juan de Fuca was blocked by protesters and tribal police for about 2.5 hours (Mapes and Solomon 1999a). Such blockages may have interrupted access to visual resources on the Olympic Peninsula. Traffic volumes on the land were otherwise normal (Subsection 3.13.3.1.2, Vehicle Traffic Patterns During the 1999 Hunt).

3.12.3.3 Media Coverage of Previous Authorized Hunts

The practice exercises, whale hunts, and associated protest activities that occurred in 1998, 1999, and 2000 were the focus of intensive media coverage in the region, including Seattle. In late summer and autumn of 1998, approximately 50 representatives of media organizations from all over the world arrived at Neah Bay to watch the Makah Tribe hunt whales (Mapes 1998a). Media coverage became an issue during the Makah Days celebration in August 1998, when its representatives crowded in front of tribal dancers, disrupting the formal welcoming ceremony (Clarridge 1998). From June 1998 to June 1999, whale-hunt-related news stories abounded in local newspapers. The *Seattle Post-Intelligencer* published 77 news items and three editorials on the topic during that period. The *Seattle Times* published 76 news items, 11 columnists' commentaries, and eight editorials during the same timeframe. Such intense attention was largely limited to the region, however. During the same period, the *New York Times* published 16 news items with the words 'Makah' and 'whale,' the *Los Angeles Times* published 13 related news items, and the *Washington Post* published three related news items.

Media coverage resumed when the Makah resumed hunting activities in April of 2000, but with less intensity than for prior hunts. Between April 1 and December 31, 2000, the *Seattle Post-Intelligencer* published 13 news items and one editorial about the hunt, protests and protesters, and associated legal actions. The *Seattle Times* published 15 news items and one editorial on hunt-related topics during the same period. As before, the hunt received considerably less attention outside of the Pacific Northwest. The *New York Times* published two hunt-related news items from April through December of 2000, the *Los Angeles Times* published four, and the *Washington Post* published a single hunt-related news item.

News of the Makah Tribe's successful hunt on May 17, 1999 received attention in local print and broadcast media. Locally, the Seattle *Post-Intelligencer* printed five photographs showing the whale in the water or on the beach; the *Seattle Times* printed four photographs, and the *Peninsula Daily News* printed seven photographs. At least two local television stations, KING-TV and KOMO-TV, sent helicopters to collect video footage of the hunt and subsequent activities. KING-, KOMO-, and KIRO-TV all extended their morning news shows to cover the story of the successful hunt, which occurred shortly before 7 a.m. (Levesque 1999). KCPQ-TV, which did not have a morning news show at that time, interrupted regular programming with occasional updates. Northwest Cable News network, a sister station of KING-TV, ran near-constant footage and commentary on May 17, and 10 hours of live broadcast of the previous day's unsuccessful hunt (Levesque 1999; McFadden 1999).

Nationwide, the story of the successful hunt received considerably less attention. Most newspapers simply published the Associated Press wire story. There was no international Web site coverage by well-known news sources such as the *London Times*, *Le Monde*, *Asahi Shimbun*, and the *Japan Times* (Barber 1999). The story was broadcast on nationwide television, however, accompanied by commentary by Peter Jennings, ABC Network, and Tom Brokaw, NBC Network. Some observers characterized the images of the dying and dead whale as brutal and suggested that footage of the whale killing would pose a public relations problem for the Makah Tribe (Sorensen 1999).

Local newspaper reader response to the hunt was substantial. The *Seattle Times* received nearly 500 letters on the topic during the latter half of May 1999, nearly one-third of the total number of letters received for that month (Anderson 1999). On the day following the successful hunt, the *Seattle Post-Intelligencer* received more than 50 e-mail messages and more than 100 telephone calls voicing opinions about the hunt (Barber 1999). The *Peninsula Daily News* also reported an unusually large volume of letters and devoted a special letters page to the topic on the Friday following the hunt (Brewer 1999). KING-TV reported that the issue generated three or four times the normal volume of phone calls and e-mail messages related to a news story (Levesque 1999).

The news director at KIRO-TV chose not to broadcast images of the actual killing of the whale because some viewers had said they did not want to see explicit footage (Levesque 1999). Nearly all public response focused on the issue of killing the whale. Only a few comments offered reactions to images of the event, for example, "I can't believe you think most of the population in Western Washington is remotely interested in viewing the graphic video" (Levesque 1999).

The *Seattle Post-Intelligencer* published excerpts of some telephone and e-mail messages received in response to their coverage of the whale hunt (*Seattle Post-Intelligencer* 1999). While most responses expressed support for or protest against the hunt, some included reactions to published images. One commenter expressed disgust at the image of Makah whalers jumping on the carcass of the whale. Another stated that the hunt of a whale should not be broadcast on television. One letter to the editor read "tonight I refuse to watch any news program for fear I will see another replay of the Makah hunt" (*Seattle Post-Intelligencer* 1999).

Of more than 30 letters published in the *Peninsula Daily News* on Friday, May 21, two contained reactions to images of the hunt. One writer described the television footage as "the most disgusting sight" she had ever seen. Another expressed the opinion that the graphic coverage should prompt viewers to express their objections to their Congressional representatives (*Peninsula Daily News* 1999).

A Google search indicated about 710 instances of media coverage in the 20 days following the September 8, 2007 unauthorized hunt, the majority in the first few days afterward. Media outlets all over the country reported the event, often using Associated Press information. Follow-up coverage included reports on the Tribe's apology and trip to Washington, D.C. The *Los Angeles Times*, *Washington Post*, and *New York Times* each ran one or two stories. Most of the coverage emanated from western Washington media. Seattle TV stations provided live reports from Neah Bay for the first few days. The *Seattle Times* had the most extensive coverage, with Lynda Mapes writing several in-depth articles. The *Times* also asked for reader feedback; 93 comments with a wide range of views were posted in response. The *Seattle Post-Intelligencer* and Port Angeles *Peninsula Daily News* ran multiple stories about the kill and activities following it. Other regional media had less extensive coverage. As news interest waned, there were several editorials and opinion pieces published, also with a wide range of views expressed.

Some anti-whaling Websites that were active during the earlier authorized hunts are no longer in existence or are not current. The Humane Society of the United States, Whale Police, Sea Shepherd, and Animal Welfare Institute posted press releases on their Websites condemning the September 8, 2007 whale kill. The few blogs covering this issue linked to or extracted from various media reports on the Internet, with limited commentary. Views seemed to be about equal between condemnations of the kill and of whale-hunting in general, and support for tribal rights and culture.

3.13 Transportation

3.13.1 Introduction

The following section documents several transportation-related issues pertaining to the Makah whale hunt. Transportation resources near Neah Bay include federal and state highways, marine vessels, and airports. Key parameters for analysis include the patterns of highway, marine vessel, and air traffic near Neah Bay.

3.13.2 Regulatory Overview

At the federal level, the Federal Highway Administration within the Department of Transportation is responsible for the management of the national highway system, which includes United States Highway 101 near Neah Bay (23 USC 101). The national highway system consists of interconnected urban and rural principal arterials and highways that serve major population centers, international border crossings, ports, airports, public transportation facilities, other intermodal transportation facilities, and major travel destinations; meet national defense requirements; and serve interstate and interregional travel (23 CFR 470A).

The Federal Highway Administration is responsible for stewardship and oversight of the federal-aid highway funds allocated to Washington State. The Washington State Department of Transportation is the state agency responsible for delivering these federal-aid funds. Under the Statewide Multi-Modal Transportation Plan (RCW 47.06), the Washington Department of Transportation is responsible for developing a statewide multi-modal transportation plan in conformance with federal requirements. The highway system includes both state and federal highways.

In the marine environment, the Washington State Department of Transportation has the responsibility to oversee the national transportation system, which includes the marine transportation system (49 USC 101). The Coast Guard is responsible for enforcement and administration of laws governing vessels, cargo, and passengers. The Coast Guard has established a permanent RNA along the northwestern Washington coast and in a portion of the entrance to the Strait of Juan de Fuca (33 CFR 165.1301). Within the RNA, a moving exclusionary zone restricts the movements of vessels near a Makah vessel that is actively engaged in a whale hunt. Coast Guard restrictions for marine vessels engaged in whale hunting activities are described in greater detail in Subsection 3.1.1.3, Coast Guard Regulated Navigation Area, and Subsection 3.15.2.1, Vessel Safety Regulations and Authorities.

The International Maritime Organization has designated a formal area to be avoided for the OCNMS. Vessels advised to stay clear of this area include all ships and barges carrying cargoes of oil or hazardous materials and all ships 400 gross tons and larger (Subsection 3.1.1.1.3, Current Issues, Area to be Avoided, and Subsection 3.2.3.3, Spill Prevention).

Air traffic safety is the responsibility of the Federal Aviation Administration (FAA). In 2012, NOAA's Office of National Marine Sancutaries announced collaborative overflight regulations with the FAA that prohibit flying motorized aircraft less than 2,000 feet (610 m) above certain portions of the Sanctuary (77 FR 3919, January 26, 2012; Subsection 3.1.1.1.2, Designation and Regulatory Overview [OCNMS]). These include all areas within 1 nautical mile (1.9 km) of the coastal boundary of the sanctuary, as well as areas within 1 nautical mile of any of the islands that constitute the Flattery Rocks, Quillayute Needles, or Copalis National Wildlife Refuges (15 CFR 922.152). These prohibitions do not apply to activities in response to emergencies threatening life, property, or the environment, or those for valid law enforcement purposes.

3.13.3 Existing Conditions

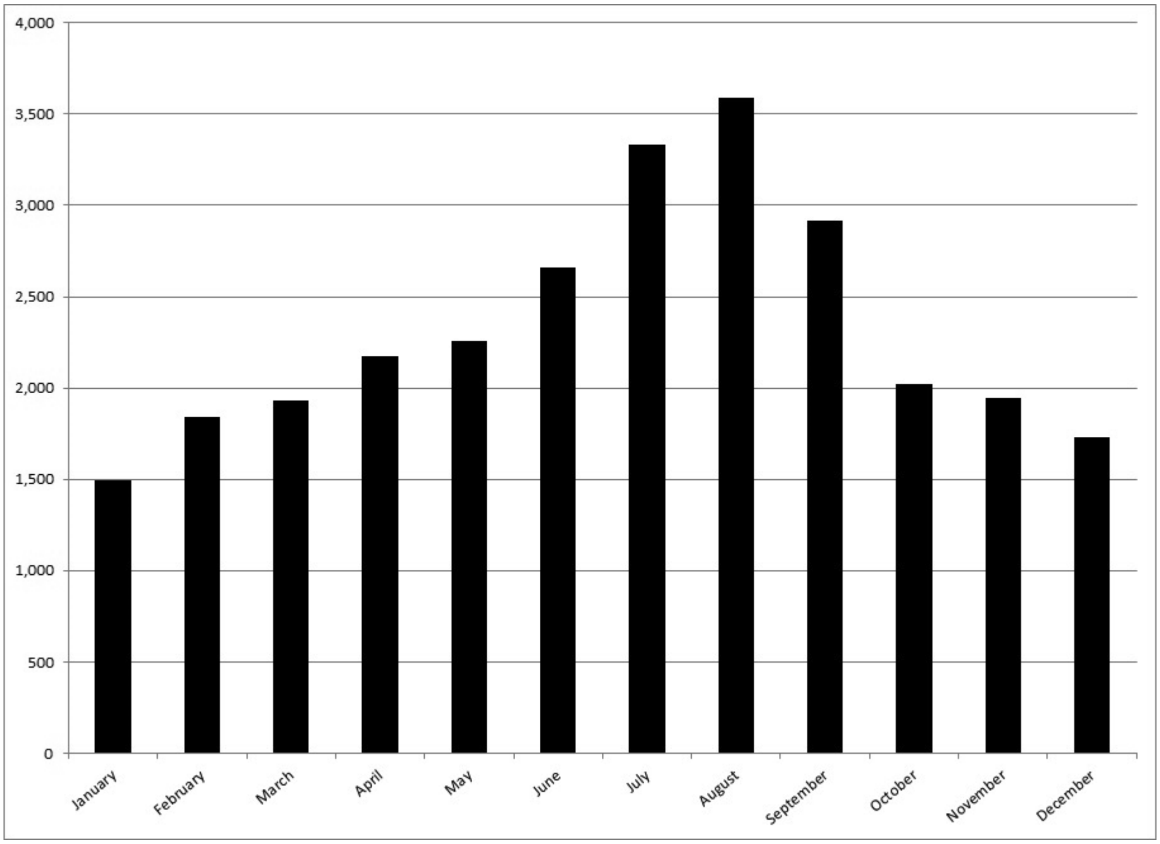
3.13.3.1 Highway Vehicle Traffic

Primary access to the isolated community of Neah Bay is via State Route 112, a narrow, winding highway that parallels the Strait of Juan de Fuca through rolling, forested terrain. An alternative route is along the closest primary highway, United States Highway 101, to Sappho and then north on a separate highway (State Route 113) that ends at State Route 112. In recognition of its outstanding scenic, recreational, and cultural qualities, State Route 112 has been designated as a national scenic byway by the United States Secretary of Transportation.

3.13.3.1.1 Typical Vehicle Traffic Volume Patterns

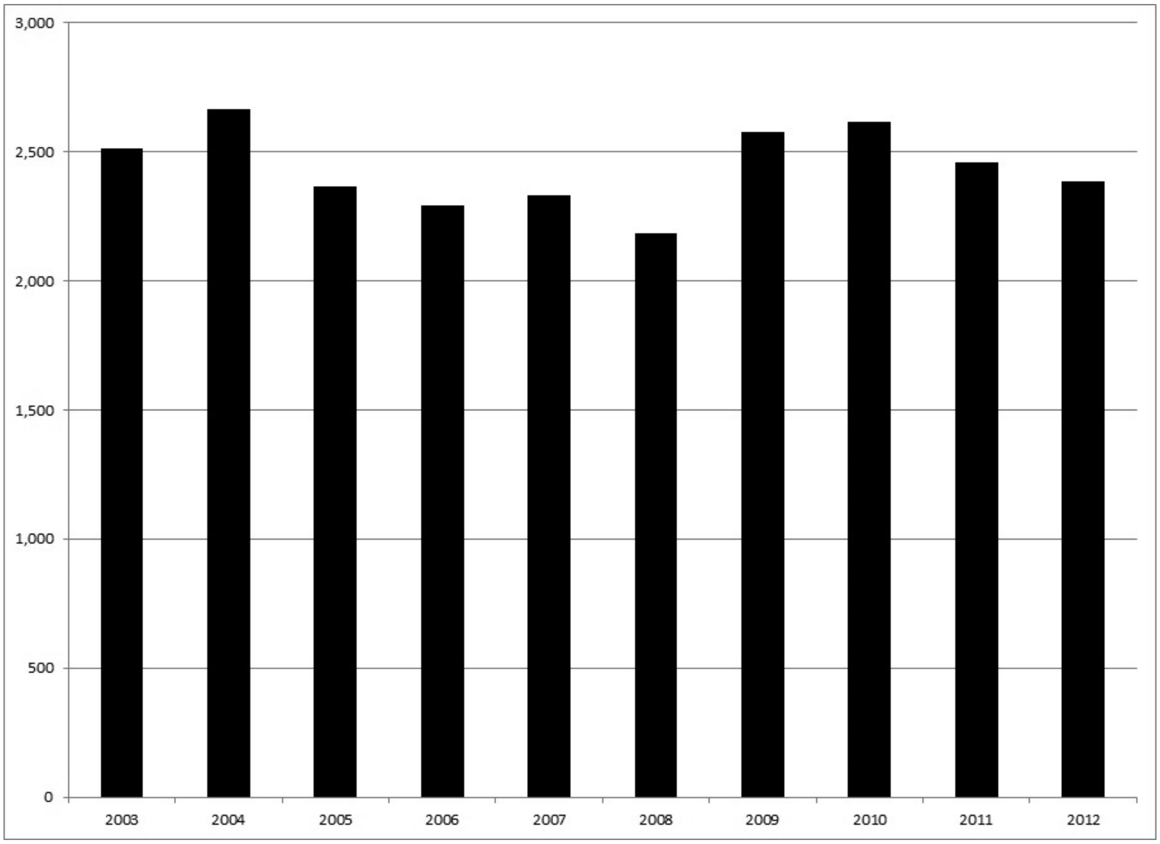
The Washington State Department of Transportation conducts traffic counts occasionally on State Route 112 at the boundary of the Makah Reservation. The most recent traffic counts were conducted in 2007 and 2010. Annual average daily traffic volumes at that location were 830 vehicles and 990 vehicles, respectively (Washington Department of Transportation 2012).

The closest permanent, full-time automated data collection station is located on United States Highway 101, near the State Route 113 turnoff to Neah Bay. Data from this station provide an indication of highway traffic patterns and trends near Neah Bay. Daily traffic counts at that station vary with the day of the week, with Fridays typically 10 percent higher than average and Sundays 10 percent below average (Washington Department of Transportation 2012). In addition, traffic counts show a strong pattern of seasonal variability, with the highest daily averages occurring during the summer months and the lowest occurring in winter (Figure 3-14). This pattern is characteristic of locations where recreational travel represents a substantial component of total annual traffic volumes (Washington Department of Transportation 2012). Over the past 10 years, average daily traffic counts at this station have varied between approximately 2,200 and 2,700 vehicles per day, with no strong increasing or decreasing trend (Figure 3-15).



Source: Washington Department of Transportation 2012.

1 Figure 3-14. Average weekday traffic counts on Highway 101 near State Route 113, by month.



Source: Washington Department of Transportation 2012.

Figure 3-15. Annual average daily traffic counts on Highway 101 near State Route 113, 2003 to 2012.

Visitation data for the Cape Flattery Trail and the Makah Museum may serve as indirect indicators of the amount of vehicle traffic on the Makah Reservation. In 2004, a natural resource interpreter at the Cape Flattery Trail recorded visitor numbers in July, August, and September. The interpreter was present from roughly noon until 6:00 p.m.; visitors who arrived before and departed after the counting period were not counted, so these data represent an underestimate of actual visitation. Based on these data, the trail received an average of 169 visitors per day in July, 189 per day in August, and 93 per day in September (Bowechop 2005b). More recent data obtained during 2005 to 2011 (excluding 2007) indicate that over 16,500 people per year visit the Cape Flattery Trail (J. Bowechop, Makah Cultural and Research Center, pers. comm., June 26, 2012). More than 60 percent of the annual visitors to the Makah Cultural and Research Center/Makah Museum arrive during June, July, and August (North Olympic Peninsula Visitor and Convention Bureau 2005b). Annual numbers of non-Makah visitors to the Makah Cultural and Research Center ranged from 6,405 to 10,678 people during 2007 through 2011 (J. Bowechop, Makah Cultural and Research Center, pers. comm., June 26, 2012). Additional information about tourist visitation to the Makah Reservation can be found in Subsection 3.6.3.2.4, Contribution of Tourism to the Local Economy.

3.13.3.1.2 Vehicle Traffic Patterns During the 1999 Hunt

News accounts of the 1998 and 1999 whale hunts described one occasion on which highway traffic was affected by activities associated with the hunt. Two days before the successful hunt on May 17, 1999, highway traffic was stopped for approximately 2.5 hours after the road was blocked by protesters and tribal police (Mapes and Solomon 1999a). No other highway blockages are described in news accounts or law enforcement records from the previous hunt, although Coast Guard records mention the occurrence of weekly protests on State Route 112 at the Makah reservation boundary (U.S. Coast Guard 1999c). Refer to Subsection 3.14.3.2, Police, for a discussion of traffic stops near Neah Bay.

Automated traffic count data for Highway 101 for the month of May 1999 do not indicate any anomalous spikes in traffic volume during the days surrounding the events of May 17, 1999. Traffic volume data for that date, along with May 22, the date of the Tribe's celebration of the successful hunt, are denoted in bold font in Table 3-41. Two trends are evident in the data. First is a steady increase in traffic volumes throughout the month, peaking on Memorial Day weekend (May 31). Second is the weekly pattern described above, wherein Friday volumes typically exceed those on Sundays. This pattern is evident in the data from the months of May 1998, 1999, and 2000; Friday volumes typically exceed those of the subsequent Sunday by at least 15 percent (Washington Department of Transportation 2005).

Table 3-41. Daily traffic counts on Highway 101 near State Route 113, May 1999.

Week Number	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1							2,340
2	2,002	2,376	2,393	2,420	2,382	2,618	2,422
3	2,143	2,432	2,458	2,486	2,530	2,764	2,558
4	2,318	**2,465**	2,502	2,635	2,680	3,159	**3,221**
5	3,161	2,994	2,647	2,782	2,954	3,431	3,446
6	3,569	3,150					

Source: Washington Department of Transportation 2005.
Note: Bold font indicates the dates of the successful hunt (May 17, 1999) and the subsequent celebration (May 22, 1999).

This pattern does not hold true on Memorial Day weekends, when Sunday volumes can approach or even exceed those of the preceding Friday. The only other exception to this pattern occurs during the weekend of May 21 to 23, 1999, when Sunday traffic exceeded traffic on the preceding Friday, although barely. This anomaly may be attributable to many factors, such as weather, and may also reflect trips by participants attending the May 22 feast and celebration.

3.13.3.2 Marine Vessel Traffic

Marine vessels that travel to Neah Bay may find moorage at the Makah Marina, where more than 200 fishing vessels (commercial and recreational) and pleasure craft can anchor. In addition, several thousand large vessels pass by Neah Bay each year on their way through the Strait of Juan de Fuca to ports in Canada and the United States.

3.13.3.2.1 Fishing Vessel Traffic

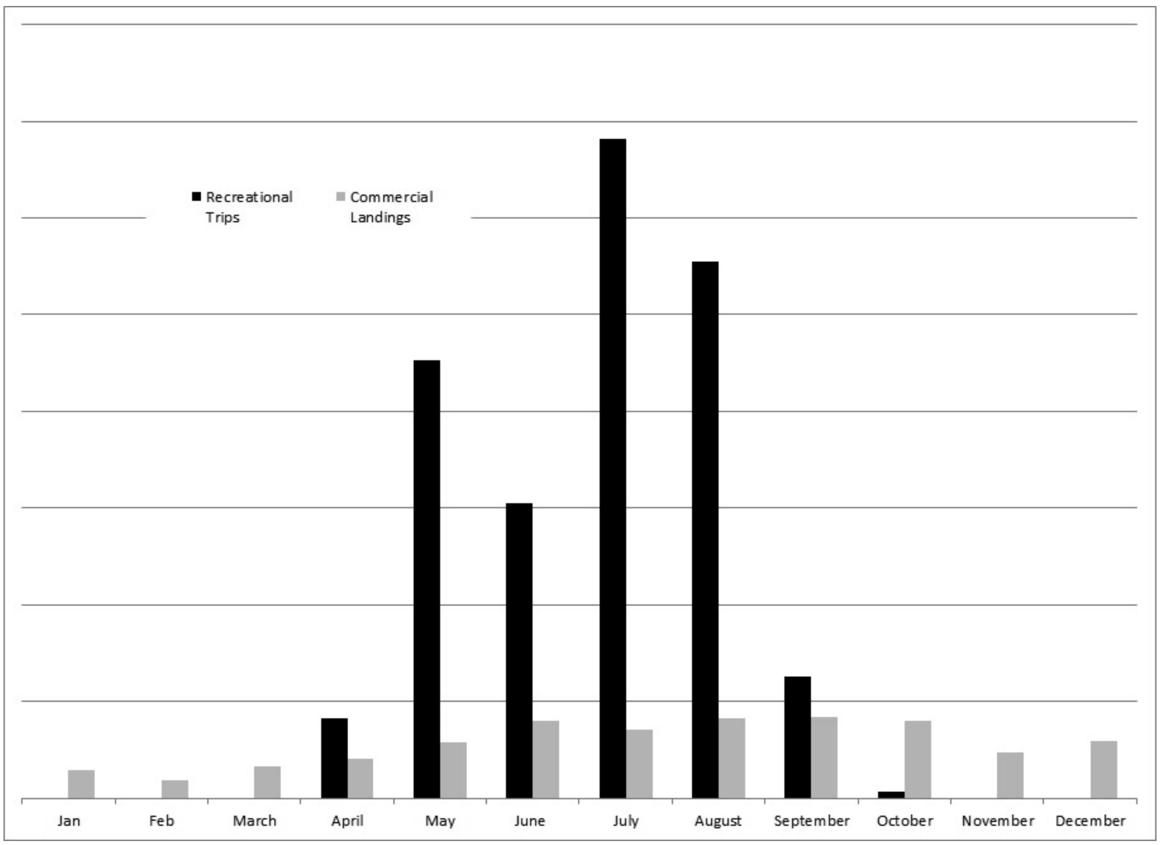
The amount of marine vessel traffic associated with commercial fishing activity can be estimated by counting commercial fish tickets for vessels that land at the Neah Bay Marina. Both tribal and non-tribal fishers are required by law to complete a fish ticket when they land their catch. Rarely, catch from a single trip might be listed on two tickets. In other cases, a vessel may engage in day-fishing trips for several days and then make a single landing. Statistically, these two circumstances offset one another and do not occur frequently enough to affect the overall total counts.

Estimates of vessel traffic associated with recreational fishing are based on vessel counts conducted by the Washington Ocean Sampling Program. Between mid-April and October, sport fishing vessels are counted either leaving the port (between 4:30 a.m. and the end of the day) or entering the port (between 8:00 a.m. and dusk).

Total boat trips at Neah Bay decreased by 34 percent between 2005 and 2008, then rebounded almost to 2005 levels by 2011 (Table 3-42). Most vessel traffic at Neah Bay is associated with recreational trips, which account for approximately 75 percent of all boat trips in all years. In most years, the peak of recreational fishing activity occurs in the months of July and August (salmon fishing season), with a secondary peak during the halibut season in May (Figure 3-16). Recreational fishing trips decrease dramatically in September, and commercial trips exceed recreational trips by October (Washington Department of Fish and Wildlife 2012b). On average, approximately 80 percent of all boat trips (commercial and recreational) occur during the months of May, June, July, and August. The 5-month period from November to March accounts for approximately 6 percent of all trips. Four percent of all trips occur in April, 7 percent in September, and 3 percent in October.

Table 3-42. Recreational fishing boat trips and commercial fishing vessel landings at Neah Bay, 2005 to 2011.

	2005	2006	2007	2008	2009	2010	2011
Recreational Trips	12,968	11,053	11,327	8,154	11,113	9,957	12,802
Commercial Landings	3,718	3,499	3,711	2,864	3,215	3,306	3,532
TOTAL	**16,686**	**14,552**	**15,038**	**11,018**	**14,328**	**13,263**	**16,334**



Source: WDFW 2012b.

Figure 3-16. Average monthly levels of marine vessel traffic at Neah Bay, 2005 to 2011.

3.13.3.2.2 Offshore Vessel Transits

Ecology produces annual reports of the number of entering transits by various vessel types. An entering transit is defined as the passage of a vessel from sea or from Canadian waters into Washington State waters, regardless of destination (Ecology 2012b). The data collected by the department identify commercial fishing, cargo, and passenger vessels 300 gross tons (272 mt) and larger, as well as tank ships and tank barges transporting oil of any tonnage. Entering transits at the Strait of Juan de Fuca provide a measure of the amount of marine traffic near the Makah Tribe's U&A. From 2009 to 2011, Ecology reported roughly 4,300 to 4,500 entering transits annually via the Strait of Juan de Fuca (Table 3-43). This averages to approximately 12 large vessels per day, with cargo and passenger vessels making up more than 80 percent of entering transits. Personnel at the Canadian Coast Guard's Tofino Station have observed very little seasonal variability in traffic volume, except in the case of fishing vessels.

Table 3-43. Vessel transits using the Strait of Juan de Fuca, 2009 to 2011.

Vessel Type and Destination	2009	2010	2011
Cargo and Passenger Greater than 300 Gross Tons[1]			
Washington Ports	1,721	1,663	1,609
Canadian Ports	1,798	2,040	2,273
Tank Ships and Barges			
Washington Ports	607	548	448
Canadian Ports	204	252	197
TOTAL	**4,330**	**4,503**	**4,527**

Source: Ecology 2010, 2011, 2012b.
[1] Includes fishing vessels and factory fishing vessels/processors.

The Tofino Station provided an estimate of approximately 40 to 50 vessel transits per day in the Strait of Juan de Fuca (entering and leaving), which equates to 20 to 25 entering transits. Based on a comparison of this estimate with the values reported by Ecology, approximately half of the daily transits are vessels less than 300 gross tons (272 mt) and not transporting oil.

3.13.3.2.3 Marine Traffic During the Previous Hunt

In the fall of 1998, as the Makah Tribe attempted to implement the first season of its hunt, several protest vessels began a 2-month occupation of Neah Bay to prevent the taking of a whale. From late September to late November, more than 15 protest vessels trailed any boat that left the Neah Bay marina (Dark 1999). Most of the protest vessels moored each night in Sekiu, a half-hour boat ride away (Mapes 1998a). The Sea Shepherd Conservation Society anchored the 180-foot (55-m) *Sea Shepherd III* and the 95-foot (29-m) cutter *Sirenian* outside Neah Bay and publicized plans to use a 27-foot (8-m) former Norwegian military submarine painted to resemble a full-grown killer whale (Mapes 1998a; Tizon 1998b). The number of protest vessels was smaller when the hunt resumed the following spring; approximately a dozen boats returned to Sekiu (Mapes and Solomon 1999b). In 1999 and 2000, the Coast Guard intercepted several protest vessels for various hunt-related violations (Subsection 3.14.3.1, Coast Guard). There is no evidence that vessel transits using the Strait of Juan de Fuca were anomalously high or low during 1999 and 2000. However, Ecology does not report vessel traffic by month (only by year), so it is not possible to determine if there were short-term changes in marine traffic patterns during the active hunt periods in those years.

3.13.3.3 Air Traffic

Three airports serve Neah Bay and the western portion of Clallam County. Closest to Neah Bay is the Sekiu Airport, approximately 20 miles (32 km) east on Highway 112. The Federal Aviation Administration (2012) estimates approximately 500 takeoffs and landings occur annually at the airport. The airport has a visual approach slope indicator system, which is a set of lights that provide visual descent guidance information during the approach to a runway.

The Forks area, approximately 30 air miles (48.3 air km) from Neah Bay (50 miles [80.5 km] by highway), has two public access airports. The Forks Municipal Airport, located on the south edge of the City of Forks, has a 2,400-foot (732-m) paved runway and receives approximately 13,600 annual takeoffs and landings (Federal Aviation Administration 2012). The Coast Guard uses the airport as a refueling station for its helicopters. The airport is also used by emergency medical air transport helicopters that service the Forks Community Hospital (Newkirk and Casavant 2002). The Quillayute Airport is a former Naval Auxiliary Air Station located approximately 10 miles (16 km) west of Forks. For the 12 months ending on December 31, 2008 (the most recent period for which data are available), the airport received approximately 6,700 takeoffs and landings (Federal Aviation Administration 2012). Neither the Forks nor the Quillayute Airport has an approved instrument approach that would allow flights to proceed in inclement weather conditions (Newkirk and Casavant 2002).

Experience from the 1999 hunt indicates that media aircraft can operate at altitudes more than 2,000 feet (610 m) above water. On the day of the successful hunt, three television news helicopters were present throughout the day; according to Coast Guard accounts of the day, the aircraft were very helpful and observed all safety precautions (U.S. Coast Guard 1999a). The only problem with aircraft occurred on one day in 1998 when a seaplane operated by protest groups made several passes lower than 2,000 feet (610 m) over the area of the hunt. Operators of the aircraft were subsequently contacted by the Coast Guard, and the activity did not recur.

3.14 Public Services

3.14.1 Introduction

The following subsection documents several public service-related issues pertaining to the Makah whale hunt. Key parameters for analysis include staffing and occurrence rates of incident responses for local law enforcement agencies, including the Coast Guard and police. Also included is a discussion of public health facilities near Neah Bay.

3.14.2 Regulatory Overview

No specific regulations pertain directly to the establishment or maintenance of public services in the project area.

3.14.3 Existing Conditions

3.14.3.1 Coast Guard

The Coast Guard maintains Station Neah Bay, a small boat station within the Makah Indian Reservation. The station is staffed by 34 active-duty personnel; equipment includes two 47-foot (14-m) motor lifeboats, one 41-foot (13-m) utility boat, and one 25-foot (8-m) response boat (U.S. Coast Guard 2012). The station also features a helicopter landing pad with fueling facilities. The station's area of responsibility extends from the Strait of Juan de Fuca east to Pillar Point and south to Cape Alava. The station responds to approximately 100 search and rescue cases a year, primarily during the summer when sports fishers and tourists are present in greatest numbers (U.S. Coast Guard 2012). The station's crew is also responsible for maritime law enforcement in the area, conducting approximately 200 safety boardings per year.

During the previous Makah whale hunt practice exercise in 1998 and hunts in 1999 and 2000, Coast Guard personnel were responsible for ensuring the safety of persons and vessels near the hunt. To this end, the Coast Guard enforced an RNA and a 500-yard (457-m) moving exclusionary zone (MEZ) around tribal vessels actively engaged in the hunt. This MEZ was designed to keep protesters, reporters, and spectators out of the area where life and property would face the greatest risk of endangerment from an injured or pursued whale or a round from a .50-caliber rifle. Refer to Subsection 3.1.1.3, Coast Guard Regulated Navigation Area, and Subsection 3.15.2.1, Vessel Safety Regulations and Authorities, for more information about operation of the RNA and MEZ in prior hunts. The Coast Guard used helicopters, a cutter, and several utility boats and Zodiacs to enforce the exclusion zone (Mapes and Solomon 1999b). In October and November of 1998, two additional 41-foot (13-m) utility boats were made available, if needed, but no extra personnel were placed on duty (Mapes 1998d). In May 1999, the Coast Guard cited the operators of four protest boats for grossly negligent operations and/or MMPA take violations, and three of the vessels were taken into federal custody (NMFS 1999; U.S. Coast Guard 1999c; U.S. Coast Guard 1999d). In April 2000, a Coast Guard utility boat responded to a protest vessel that was violating the exclusionary zone around a Makah canoe engaged in the whale hunt. Refer to Subsection 1.4.2, Summary of Recent Makah Whaling – 1998 through 2007, and Subsection 3.15.3.4, Behavior of People Associated with the Hunt, for more details about protest activities.

3.14.3.2 Police

The Makah Tribal Police have jurisdiction over crimes and infractions committed by Native Americans from any tribe on reservation lands. In addition, the tribal police have the authority to detain non-Indians for violations of law occurring on the reservation until they can be turned over to the appropriate authority (county, state, or federal). Refer to Subsection 3.1.2.1, Makah Tribal Departments and Agencies, for a description of the tribal police department and Subsection 3.1.2.2.1, Makah Public Safety Program, for a description of the Tribe's emergency management plan. In 2012, Makah Public Safety responded to emergencies in the following ways:

- Tribal dispatchers received 2,120 calls, including 911 calls.
- The Neah Bay EMS responded to a total of 258 incidents, including 258 calls, 24 ambulance transfers to outlying hospitals, 54 in-house treatments, 10 airlifts, 2 search and rescues, and 6 fire department assists.
- Officers responded to 2,092 police calls.

Non-tribal law enforcement activity in the area is conducted by the Clallam County Sheriff's Department. The patrol division of the Sheriff's Department is responsible for police patrols in all unincorporated areas of Clallam County, responding to calls for service made by citizens in need of police assistance and actively seeking out crime and traffic offenders. The closest deputy lives approximately 20 to 30 minutes from Neah Bay, which would be the minimum amount of time required to respond to an unanticipated law enforcement need. The Washington State Patrol oversees traffic safety compliance on roads and highways in the area. Two state troopers patrol the northwestern portion of the Olympic Peninsula, from the western end of Lake Crescent to the Quinault Indian Reservation (Washington State Patrol 2012). This area includes approximately 70 miles (113 km) of United States Highway 101; 70 miles (113 km) of State Routes 110, 112, and 113; and numerous local and other roads.

From 2005 and 2008, the Clallam County Sheriff's Department conducted an average of approximately 17 traffic stops annually in the western portion of the county, including State Route 112 and Highway 101 west of Lake Crescent, neither of which is on the Makah Reservation. During the same period, the Sheriff's Department responded to approximately 158 calls for service annually (S. Orth, Clallam County Sheriff's Office Administrative Specialist, pers. comm., July 27, 2012). The Sheriff's Department has not had to respond to any calls for disturbance of the peace or similar problems since 1999 (S. Orth, Clallam County Sheriff's Office Administrative Specialist, pers. comm., July 27, 2012).

The Washington State Patrol has more-detailed data available for policing activities conducted by state troopers (Table 3-44). From 2006 to 2011, state troopers conducted an annual average of approximately 1,000 traffic stops on the 36 miles (48 km) of state and federal highway closest to Neah Bay. This area includes United States Highway 101 between Forks and the turnoff for State Route 113, State Route 112 west of Sekiu, and the entire length of State Route 113. In addition to conducting traffic stops, state troopers responded to an average of 40 collisions in this area each year. In most years, approximately half of these collisions occurred on the 15-mile (24-km) stretch of State Route 112 between Sekiu and the Makah Reservation boundary, which had an average annual rate of 1.3 collisions per mile. The corresponding rates for United States Highway 101 and State Route 113 were 1.2 and 0.7 collisions per mile, respectively.

A law enforcement task force was assembled to ensure public safety during the previous hunts in 1998, 1999, and 2000 (Section 3.15, Public Safety, for more information about the task force). The task force was prepared to deploy any combination of 14 law enforcement agencies, from the Clallam County Sheriff's Department to the Royal Canadian Mounted Police. Ships, boats, planes, helicopters, squad cars, and the National Guard were prepared to participate, if necessary. The task force prepared for a worst-case scenario of 15 days of police protection, costing $160,000 in overtime, equipment, and supplies (Mapes 1998d). Despite serious concern about conflicts between protesters and whaling supporters, the full strength of the task force was never needed.

Table 3-44. Neah Bay area traffic stops and collisions, 2006 to 2011.

	2006	**2007**	**2008**	**2009**	**2010**	**2011**
State Route 101 Mileposts 192-203						
Traffic stops	459	758	576	529	514	479
Collisions	10	15	13	15	11	14
State Route 112 Mileposts 0-15						
Traffic stops	192	86	174	171	210	76
Collisions	20	32	21	15	16	13
State Route 113 Mileposts 0-10						
Traffic stops	290	286	232	260	174	122
Collisions	11	7	10	6	3	6
TOTAL						
Traffic Stops	**941**	**1,130**	**982**	**1,060**	**898**	**677**
Collisions	**41**	**54**	**44**	**36**	**30**	**33**

Source: Washington State Patrol 2012.

The Clallam County Sheriff's Department did not find that the hunt and associated activities imposed a substantial burden on department staff. Data from the Washington State Patrol indicate a spike in traffic stops on State Route 113 in 1999, which could be related to the Makah whale hunt (B. George, Washington State Patrol, pers. comm. October 27, 2005). Particular concern preceded the celebration of Makah Days in August 1998. There were rumors that up to 20,000 anti-whaling demonstrators might attend to disrupt the tribal community festival. Washington Governor Gary Locke mobilized 800 members of the National Guard to ensure public safety. By the end of the festival weekend, there had been no demonstrations and few protesters (Mapes 1998d). The following year, $825,000 of the state general fund was allocated to reimburse costs associated with this activation (Washington State Senate 1999).

3.14.3.3 Local Medical Facilities

The Sophie Trettevick Indian Health Center on the Makah Reservation employs physicians, a dentist, dental hygienist, and other practitioners (nurse practitioners, registered nurses, or public health nurses). The facility, operated by the Makah Tribe, provides comprehensive primary and dental health services. The clinic also has x-ray services and a pharmacy. The normal hours of operation are Monday through Friday, from 8:00 a.m. to 5:00 p.m. After-hours and emergency services are provided by emergency responders via 911 calls, 24 hours per day, 7 days per week. Emergency response includes stabilization and transport to the closest appropriate facility. Airlift Northwest (Seattle) can be called in, and patient destination is determined by the emergency responder. If Airlift Northwest is not available, the Coast Guard may provide transport. For emergencies on the water, the Coast Guard is the responder.

Although the health clinic provides day-to-day care service to tribal members, it will treat anyone with life or limb-threatening injuries. Injured non-Indian patients are stabilized and transported to an appropriate facility. The clinic has a memorandum of agreement with the Coast Guard to provide services and with Clallam Bay Fire District 5 to provide mutual assistance in emergency situations. The clinic has a Comprehensive Emergency Management Plan (2005) that dovetails to the Makah Comprehensive Management Plan (Subsection 3.1.2.2, Makah Tribal Programs and Management Plans).

The closest 24-hour medical facility is the Forks Community Hospital, approximately 50 miles (81 km) away. This is a Level 4 trauma care facility; patients with life-threatening injuries are stabilized and transported by Airlift Northwest or ambulance to more advanced trauma facilities, if necessary. The closest Level 3 trauma care facility (a facility with the resources for emergency resuscitation, surgery, and intensive care for most trauma patients) is at Olympic Medical Center in Port Angeles, 71 miles (114 km) from Neah Bay and 58 miles (93 km) from Forks. The closest Level 1-2 trauma care facility, which supports the full availability of specialists and can provide back-up resources for the care of exceptionally severe injuries, is Harborview Medical Center in Seattle, 120 air miles (193 air km) away.

3.15 Public Safety

3.15.1 Introduction

Aboriginal subsistence whale hunting is an inherently dangerous activity. The 2006 IWC Whale Killing Methods Workshop Report indicated, for example, that fatal accidents are not uncommon in Arctic aboriginal subsistence whaling hunts; between one and six people die annually in the Alaska and Chukotka Native hunts, combined (IWC 2007a). Five factors in the local environment may affect public safety: location of the hunt; weather and sea conditions; behavior of the targeted species (the gray whale); number and behavior of people associated with the hunt (including protesters); and hunting equipment, including vessels and weapons. Some level of hunting currently exists on the Makah Reservation (e.g., for deer and elk), but the number of injuries associated with weapons accidents in hunting is unknown.

3.15.2 Regulatory Overview

3.15.2.1 Vessel Safety Regulations and Authorities

Any Makah whale hunt would occur within the EEZ of the United States, where the Coast Guard has enforcement authority over vessel safety under the Ports and Waterways Safety Act (33 USC 1221 *et seq.*). The Coast Guard has established an RNA in the Strait of Juan de Fuca and adjacent coastal waters of northwest Washington (33 CFR 165.1310) to enforce vessel activities near any Makah whale hunt and reduce the danger of loss of life and property from any hunt. Refer to Subsection 3.1.1.3, Coast Guard Regulated Navigation Area, and Figure 3-1. Designated and Managed Areas, for information about location of the RNA in relation to the project area. When the Coast Guard finalized the RNA after the 1999 hunt had occurred, it specifically found that "[t]he uncertain reactions of a pursued or wounded whale and the inherent dangers in firing a hunting rifle from a pitching and rolling small boat are likely to be present in all future hunts, and present a significant danger to life and property if persons or vessels are not excluded from the immediate vicinity of a hunt" (64 Fed. Reg. 61209, November 10, 1999).

Within the RNA, an MEZ is activated when one Makah whale hunt vessel displays an international numeral pennant 5. The whale hunt vessel may be a canoe or a motor boat; the MEZ extends 500 yards (457 m) around the vessel. The zone operates between sunrise and sunset, when surface visibility exceeds 1 nautical mile (33 CFR 165.1310(b)). The MEZ is deactivated upon sunset, when visibility is reduced to less than 1 nautical mile, or when the Makah hunt vessel takes down the international numeral pennant 5 (33 CFR 165.1310(b)). No person or vessel may enter the MEZ when it is activated, except for the authorized Makah whale hunt vessel, an authorized media pool vessel preauthorized by the Coast Guard, or another vessel(s) or person(s) authorized by the Coast Guard (33 CFR 165.1310(c)), such as the observer vessel. The authorized media pool vessel must maneuver to avoid positioning itself between whales and hunt vessels, out of the line of fire, at a prudent distance and location relative to the whale hunt operations, and in a manner that avoids hindering the hunt or path of the whale in any way (33 CFR 165.1310(f)(3)). The media pool vessel must operate at its own risk, but in accordance with safety and law enforcement instructions from Coast Guard personnel (33 CFR 1310(f)). The regulation does not affect normal transit or navigation in the RNA. The Makah whalers must provide specific broadcasts on a marine radio channel (Channel 16 VHF-FM), starting one-half hour before they begin whale hunting operations and continuing every half hour until hunting activities end. The broadcasts advise mariners of the 500-yard (457-m) exclusion area and urge them strongly to remain even further away from whale hunting activities as an additional safety measure (33 CFR 1310(e)).

The Coast Guard’s regulations are consistent with the International Maritime Organization’s guidelines for preventing collisions at sea (1972 Convention on the International Regulations for Preventing Collisions at Sea) and meet the goals of IWC Resolution 2006-2. At the 58th Annual Meeting on St. Kitts, the IWC adopted Resolution 2006-2 on the Safety of Vessels Engaged in Whaling and Whale Research-related Activities, recognizing concerns about confrontations related to whaling activities at sea and ports. The IWC and contracting governments acknowledged the right to legitimate and peaceful forms of protest and demonstration, but agreed and declared that the IWC and contracting governments do not condone any actions that are a risk to life and property relative to confrontations related to whaling between vessels at sea.

3.15.2.2 Weapon Safety Regulations and Authorities

For Makah tribal members on the Makah Reservation or hunting in the Tribe’s U&A, Title 10 of the Makah Law and Order Code, Weapons Control Ordinance, governs the possession and use of weapons. Adults may possess weapons on the reservation, provided that individuals do not carry their weapons with intent to assault another, do not threaten to use or exhibit weapons in a dangerous or threatening manner, and do not use weapons in a fight or quarrel (Section 10.5.01). Weapons also must not be concealed; loaded and carried in a vehicle on a public road; discharged from, upon, or across any public highway (Section 10.5.01); and not possessed or discharged in any closed area (Section 10.5.02). Juveniles from 16 to 18 years of age may possess weapons after completing a weapons training course and receiving a weapons safety certificate from the chief of the Makah Tribal Police (Section 10.2.01).

Under the proposed action and in the past hunts, the Tribe has also established certification guidelines and a certification process for all whaling team members with more in-depth training for captains, harpooners, riflemen, safety officers, and chase boat skippers to ensure that the hunt is carried out in as efficient, safe, and humane a manner as practicable. The guidelines and certification process ensure that every whaler has received adequate training to perform his assigned role on the team. Certification of riflemen includes a demonstration of proficiency and accuracy under simulated hunting conditions. Under the proposed action, and in past hunts under the 2001 Gray Whale Management Plan, the rifleman (onboard the Makah chase boat) cannot discharge a weapon until authorized to do so by a Makah safety officer. The primary safety measures, aside from standard weapon handling measures that apply, are:

1. The safety officer has the authority to determine whether visibility is less than 500 yards (457 m) in any direction, in which case the whaling captain suspends the hunt.
2. The safety officer would not authorize the rifleman to discharge the weapon unless the barrel of the rifle was above and within 30 feet (9.1 m) or less from the target area of the whale.
3. The safety officer would not authorize the rifleman to discharge the weapon unless the field of view is clear of all persons, vessels, buildings, vehicles, highways, and other objects or structures that if hit by a rifle shot could cause injury to human life and property.

Off the Makah Reservation (including on the territorial sea), or for non-Indians on the Reservation, the laws of Washington State apply to weapon possession and use. The Revised Code of Washington (3.1 RCW 9.41.270(1)) contains the following language:

> [i]t shall be unlawful for any person to carry, exhibit, display, or draw any firearm, dagger, sword, knife or other cutting or stabbing instrument, club, or any other weapon apparently capable of producing bodily harm, in a manner, under circumstances, and at a time and place that either manifests an intent to intimidate another or that warrants alarm for the safety of other persons.

3.15.2.3 Other Safety Regulations and Authorities

For Makah tribal members on the Makah Reservation or hunting in the Tribe's U&A, several different provisions of Title 5 of the Makah Law and Order Code, Criminal Code, prohibit acts such as assault, harassment, trespass, criminal mischief, and injury to public property, which could apply to disruptions associated with protest activities. Subsection 3.1.2.1, Makah Tribal Departments and Agencies, describes the Makah Public Safety Department, which is responsible for enforcing the Tribal Code, and Subsection 3.1.2.2, Makah Tribal Programs and Management Plans, describes the Makah Tribe's law enforcement programs. Off the Makah Reservation, or for non-Indians on the reservation, the laws of Washington State apply to such activities. The Revised Code of Washington prohibits a similar suite of criminal activities that could be associated with protest activities.

3.15.3 Existing Conditions

3.15.3.1 Location of the Hunt

The bulk of the Makah U&A lies along the geographically remote and isolated Pacific Ocean coast, but an arm of the U&A extends into the Strait of Juan de Fuca in United States waters from Neah Bay to Tongue Point near Port Angeles (Figure 1-1, Project Area). The portion of the U&A along the Strait of Juan de Fuca is less remote and is bordered by public lands, communities, and State Route 112, which runs parallel to the shoreline for nearly the entire length of the Strait portion of the U&A. A few points of State Route 112 closely hug the shore, but it is farther inland elsewhere. The current Coast Guard RNA is smaller than the U&A, and the portion of the RNA that extends into the Strait stops just past the Makah Reservation (Figure 3-1. Designated and Managed Areas).

3.15.3.2 Weather and Sea Conditions

3.15.3.2.1 <u>Relevance of Weather and Sea Conditions</u>

The IWC has recognized that prevailing weather conditions in association with relatively small vessels and traditional hunting techniques may diminish the efficiency of aboriginal subsistence whaling (see, for example, IWC Resolution 2001-2 and IWC Resolution 2004-3). Seasonal and weather variations in the local environment where aboriginal hunts occur also affect the safety of whale hunts, including locating, striking, and killing the whale; recovering the whale; and towing it back to a butchering location. In its Report on *Weapons, Techniques, and Observations in the Alaskan Bowhead Whale Subsistence Harvest*, the United States reported that fall bowhead hunts occur under conditions that include high winds, rough seas, and ice-choked waters and stated that fatal accidents are a fact of the hunt under such treacherous conditions (Alaska Eskimo Whaling

Commission 2006). The weather and sea conditions in the project area can also be treacherous, as described further below.

Dangerous weather and sea conditions for the Makah historic whale hunts are evident in their traditional equipment design, such as 36-foot-long and five-foot-wide (11-m-long and 1.5-m-wide) canoes designed for seaworthiness and ability to travel great distances offshore (Arima 1983; Renker 2012), and in their statements before the British Commissioners in the 1890s, where tribal members reported that pelagic seal hunting was “practically given up” for about 20 years because of loss of lives at sea while hunting (Subsection 3.10.3.4, Makah Historic Whaling, Cessation of the Hunt, citing Crockford 1996). During the 1998 training exercises and the 1999 to 2000 Makah whale hunts, no weather-related accidents or fatalities occurred. All hunts occurred in late April and May, when weather and seas generally begin to improve in the Makah U&A. On May 11, 1999, the Makah suspended one of their 4 days of hunting for that year after less than 2 hours of hunting because of inclement weather conditions (Gosho 1999; NMFS 1999). During the fall/winter of 1999/2000, the Makah Tribal Council did not issue any whaling permits because weather conditions were unsuitable.

Relevant weather and sea-state parameters for the project area and proposed action include air temperature, sea temperature, fog and precipitation, wind speed, and wave height. Air temperature is important to hunting safety because ocean water can freeze on deck (generally at 28.5°F [-1.9 °C]), potentially causing equipment to be slick or otherwise hampered. This could lead to injuries or reduce the accuracy and efficiency of the harpooner and rifleman. Sea temperature may also be relevant to determining the risk of hypothermia if a person involved in or protesting the hunt enters the water (for example as the result of a boat overturning or other accident). Fog and precipitation can reduce visibility, creating a potential for vessel collisions or reducing the accuracy of the harpooner or rifleman. Beattie (2001) recommended a minimum visibility standard of 500 yards (457 m) in all directions during the Makah hunts to eliminate problems with boats entering the 500-yard (457 m) MEZ (Subsection 1.4.2, Summary of Makah Whaling — 1998 through 2007, for information about the many boats that have been associated with past Makah hunts). The Makah included this 500-yard (457 m) visibility recommendation in their proposed action. Wind speed can also affect the accuracy of the harpooner or rifleman.

Wave height can affect vessel operations and stability, as well as visibility and orientation of the whale, all of which can influence the accuracy of the harpooner or rifleman. Beattie (2001) recommended that the Makah hunts institute a 30-foot (9.1-m) distance limitation between the rifleman and the whale and require that a rifleman only fire at a downward angle, based on concerns about sea swell as it relates to accuracy (i.e., missed shots) and ricochets. The Makah's proposed action includes the 30-foot (9.1-m) distance limit and downward firing angle. In a later report, again examining the safety and guidelines for the Makah hunt, Graves et al. (2004) concluded that shots fired below an elevation angle of -6.2° (that is, with the gun pointed downward at the target in the water and below the shooter's horizon by at least 6.2 degrees) will ensure a very low probability of ricochets, "whether the water surface is glass smooth or rough with waves" (Subsection 3.15.3.5.2, Weapons Associated with the Hunt, Secondary Killing Methods).

3.15.3.2.2 Description of Weather and Sea Conditions in the Project Area

Wind direction, ocean surface temperatures, terrain, and the intensity of high and low pressure centers over the north Pacific Ocean produce a marine climate in the project area characterized by distinctive seasons marked by highly variable weather (U.S. Department of Agriculture 2013; National Park Service 2013). Table 3-45 displays precipitation levels at Tatoosh Island, visibility (fog) ratings at the Quillayute Airport[74], and air and sea temperatures, wind speeds, and wave heights measured at the Strait of Juan de Fuca Traffic Separation Lighted Buoy ("J buoy") anchored 7 miles (11.4 km) north of Tatoosh Island.

Variations in air and sea temperatures and precipitation follow a seasonal pattern. Daily average air temperature drops steadily from August through January, with warming beginning in February and continuing through July. Daily average air temperature ranges from around 43° F (6° C) in January to around 55° F (13° C) in July. Sea temperature follows a similar pattern, ranging from an average daily low around 46° F (8° C) in February to around 53° F (12° C) in July and August. Measurable precipitation occurs on approximately 200 days each year, with annual average precipitation amounting to around 78 inches (2 m) and nearly half of that occurring in the 3 months of November through January. The summer months of July and August are usually the driest; however, heavy fog (the other factor affecting visibility) also typically occurs during the late summer. The period from May through July tends to have the fewest heavy fog days combined with relatively low precipitation.

[74] The Quillayute Airport is located approximately 9 miles (14.5 km) south of the proposed hunt area but is the closest climatological station reporting visibility data (i.e., number of days with heavy fog). Although the airport is approximately 3 miles (4.8 km) inland from the coast, the monthly patterns of heavy fog days are similar to other coastal stations much farther away from the proposed hunt area (e.g., Port Angeles and Hoquiam, Washington).

Winds in the project area are strongest from November through March, when daily average wind speeds range from 11.1 to 14.4 knots (5.7 to 7.4 m/s). Winds typically taper off in the spring, and during the summer months of June through August average wind speeds decline to 5.4 to 6.2 knots (2.8 to 3.2 m/s) and gale-force gusts[75] are absent. Gale-force gusts begin to recur in September and wind speeds increase steadily to peak average and maximum values during the winter. Wave heights follow a similar pattern, with lowest heights around 4 feet (1.2 m) during the summer months of June through August and highest around 8 feet (2.4 m) during the winter months. Maximum wave heights can approach 33 feet (10.1 meters) during the month of December.

According to the tribe's marine mammal biologist, wave height and wind speed are two of the most important variables likely to affect a whale hunt (J. Scordino, Makah Tribe Marine Mammal Biologist, pers. comm., July 31, 2013). Based on experience during hundreds of boat-based marine mammal surveys in the Makah U&A, the Tribe's biologist estimated that the best chances for small vessels to pursue a gray whale in coastal waters would occur when wave heights are less than 6 feet (1.8 m) and wind speeds are less than 16 knots (8.2 m/s). Using data from the J buoy off Cape Flattery (NOAA National Data Buoy Center 2013), Table 3-45 summarizes the percent of monthly observations that exceed these values, while Figure 3- displays a synthesis of the available data to estimate the number of days with both favorable wind and wave conditions (i.e., at or below the stated values). Inclement weather during November to March would likely result in only 5 to 7 days with favorable conditions per month (on average) during that period, followed by an increase to 13 to 23 days per month in April and May. Nearly every day during June through August would present favorable conditions, after which hunters might encounter 12 to 21 days with favorable conditions during September and October.

[75] The National Weather Service (2013) defines a gale as sustained surface winds of 34 to 47 knots (18 to 24 m/s).

Table 3-45. Climatological data from stations in the vicinity of the proposed hunt area.

Weather Elements	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	*Year*	Yrs of Record
Air Temperature (degrees F) at J Buoy[1]														
Mean	43.3	44.2	45.3	46.8	50.4	52.5	54.7	54.1	52.9	50.7	47.3	43.7	*49.3*	5
Mean daily maximum	53.8	52.0	55.6	58.8	67.1	61.0	71.2	65.5	63.7	61.3	57.9	55.9	*71.2*	5
Mean daily minimum	32.7	34.3	33.6	34.7	43.5	45.9	48.2	47.3	46.6	39.6	28.9	25.0	*25.0*	5
Sea Temperature (degrees F) at J Buoy[1]														
Mean	46.6	46.2	47.7	48.9	50.7	52.3	53.4	53.2	52.2	51.6	50.5	47.7	*50.4*	5
Mean daily maximum	51.1	50.4	51.3	53.6	58.8	60.3	61.7	61.9	61.7	57.7	55.4	51.4	*61.9*	5
Mean daily minimum	43.0	43.3	45.1	45.7	46.6	47.5	48.0	49.3	48.2	47.7	46.8	44.4	*43.0*	5
Precipitation (inches) at Tatoosh Island[2]														
Mean amount	10.6	8.9	8.1	5.3	3.0	2.7	2.3	2.1	3.5	8.3	10.7	12.2	*77.6*	36
Greatest amount	22.6	21.2	14.8	10.8	8.1	7.8	7.7	5.1	8.0	14.2	22.2	16.8	*101.6*	36
Least amount	1.0	2.9	2.9	0.7	0.6	0.5	<0.1	0.2	1.2	2.5	2.9	6.2	*58.6*	36
Maximum amount-in 24 hours	3.2	3.2	2.7	3.1	1.6	2.7	2.4	2.2	2.2	5.3	3.8	3.3	*5.3*	36
Mean number of days with precipitation	22	19	20	17	13	13	11	12	11	17	21	24	*199*	36
Visibility at Quillayute Airport[3]														
Mean number of days with heavy fog*	2.5	1.3	2.0	2.5	2.2	2.9	3.2	5.8	6.5	7.0	3.2	2.8	*41.9*	13
Winds at J Buoy[1]														
Mean wind speed (knots)	14.4	12.6	11.1	9.8	8.2	6.2	5.6	5.4	6.5	10.1	13.5	13.5	*9.5*	8
Maximum wind speed (knots)	51.1	44.9	53.1	39.3	40.8	33.2	27.2	29.4	40.6	43.3	60.3	58.1	*60.3*	8
Percent of observations ≤ 16 knots	63	80	82	95	97	100	100	100	98	89	71	69	-	8
Waves at J Buoy[1]														
Mean wave height (feet)	8.4	7.9	7.4	6.3	5.0	4.4	4.2	4.0	5.3	6.7	8.3	8.4	*6.2*	8
Maximum wave height (feet)	24.2	25.4	22.9	17.0	22.6	14.0	11.6	12.4	19.3	24.0	24.8	32.6	*32.6*	8
Percent of observations ≤ 6 feet	27	27	23	46	75	81	87	92	82	42	25	23	-	8

[1] NOAA National Data Buoy Center 2013
[2] Western Regional Climate Center 2013a
[3] Western Regional Climate Center 2013b
* Heavy fog days have visibility ratings of ¼ mile or less.

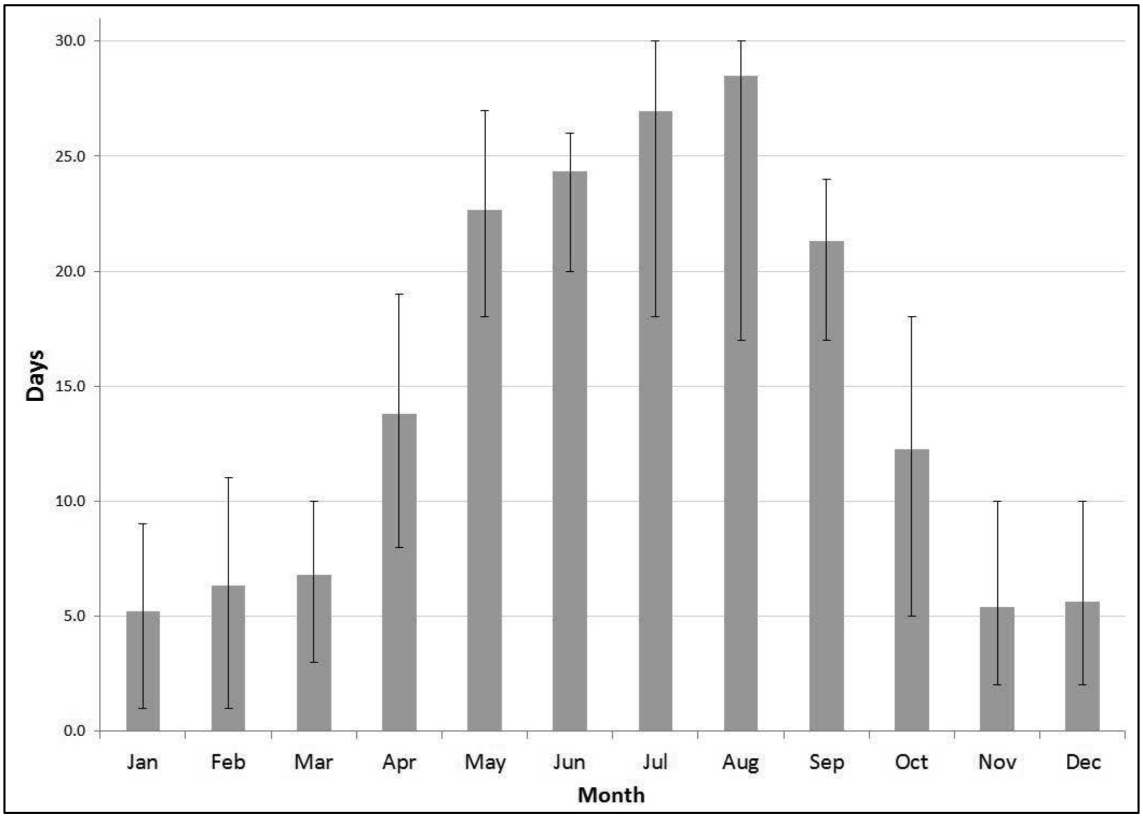


Figure 3-17. Estimated number and range of suitable hunting days: wind speeds ≤ 16 knots (8.2 m/s) and wave heights ≤ 6 feet (1.8 m).

Source: 2004-2012 J Buoy Data available from NOAA National Data Buoy Center 2013.

3.15.3.3 Behavior of the Gray Whale

Early whalers referred to gray whales as 'devil fish' and 'hard head' because gray whales were reported to attack whaling skiffs when harpooned, frequently causing a loss of human life (Henderson 1984). During the IWC's 2003 workshop on whale killing methods, the Russian delegate emphasized the aggressive behavior of gray whales (IWC 2004c), and such behaviors continue to be reported during hunts by Chukotkan natives (e.g., IWC 2012i). The violent struggles of a struck whale can result in vessels being capsized, persons on vessels being knocked into the water (Alaska Eskimo Whaling Commission 2006), or individuals becoming entangled in the lines fastened to the whale. Even postmortem movements of a whale may be dangerous. Towing a dead whale also presents hazards, particularly if the whale is not well moored to the vessel (Alaska Eskimo Whaling Commission 2006). While the Makah hunts in 1998 through 2000 did not result in any fatal accidents, hunting disasters did occur in prior whaling days. Arima (1983) reported that, "[t]he dangerous [moments of the hunt] lasted until all the line and floats were . . . out because someone could get caught in a loop or the canoe could be capsized or smashed in the first violent struggles of the whale before it sounded.”

3.15.3.4 Behavior of People Associated with the Hunt

Based on experience in the 1998 Makah training exercises and the 1999/2000 hunts, any future Makah whale hunting will likely generate some degree of public interest that may involve public protests and the media. For additional information, see Subsection 1.4.2, Summary of Recent Makah Whaling – 1998 through 2007, and Subsection 3.12.3.3, Media Coverage of the 1998 through 2000 Hunts.

Before the Makah began the gray whale hunt in 1998, law enforcement authorities had advance notice of likely protests and conflicts between those protesting and those supporting the hunt. Prior to the hunt, the Makah Tribal Council directed the Makah Police Chief to form a task force of Makah departments (including the Police Department and Health Clinic) and off-reservation public safety resources (including Washington State Patrol, Clallam County Sheriff’s Office, Coast Guard, Federal Bureau of Investigation (FBI), Department of Defense, other tribal police departments, etc.) to recommend a strategy to address any potential public disturbance related to whale hunts. The strategy called for close coordination of tribal, state, and federal authorities, including the military (Subsection 3.14.3.2, [Public Services] Police, for more detail). The following discussion summarizes the protest activities and conflicts before and during the 1998 to 2000 whale hunts, including law enforcement response.

In 1998, the Makah whaling crew began to prepare for a hunt scheduled to start October 1, 1998. On August 25, 1998, the Makah Tribal Council passed Tribal Resolution 189-98 stating that protest vessels were not to dock at Neah Bay. This meant that protesters were not to attempt to disembark from vessels. A flotilla of protest vessels began to arrive before October 1, anchoring offshore in Neah Bay near Waadah Island. It included zodiacs, kayaks, a few larger boats belonging to the Sea Shepherd Conservation Society, and a two-person Norwegian Navy surplus submarine, painted like a killer whale and intended to deliver killer whale calls into the water to scare gray whales away. Federal and state officials advised the Sea Shepherd Conservation Society that noise emitted by the killer whale submarine might constitute harassment under the MMPA (Victoria Times Colonist 1998). Others moored in nearby Sekiu, away from the reservation. The Sea Shepherd Conservation Society coordinated volunteers to conduct scouting trips up and down the coast in 15 boats, watching for the whaling canoe (Mapes 1998e). A British Columbia whale-watching charter organization representing 10 firms also appeared on October 1

(Mapes 1998e). By October 8, the protest vessels had deployed twice in reaction to a false alarm that the Makah were hunting whales (Mapes 1998e).

On November 1, 1998, one of the protesting organizations (Sea Shepherd Conservation Society) notified the Makah Tribal Council and law enforcement officials that a staged demonstration would take place. Coast Guard and Clallam County Sheriff's Office personnel remained at the Coast Guard base in Neah Bay, but stayed in contact with Neah Bay Police, who took the lead according to the previously agreed upon task force structure. The M/V *Sirenian*, one of the larger boats, was steered up near the boat dock, and several zodiacs, kayaks, and jet skis approached and sped around inner Neah Bay. The protest boats played killer whale vocalizations over a loudspeaker and blew air horns (Mapes 1998f), shouted at tribal members onshore, and displayed protest banners. Crowds of Makah tribal members assembled on the waterfront, in cars and on the shore, exchanging insults and honking horns; several members beat tribal drums, danced, and sang songs (Mapes 1998f; Shukovsky 1998a). Some Makah youths ran out on the docks with firecrackers and rocks, throwing them at the protest vessels, breaking a window on the *Sirenian*. Three protesters in a zodiac attempted to dock the vessel (to accept a dinner invitation from a Makah member); someone pushed one of the protesters off the dock into the water, without injury (Lacitis 1998; Mapes 1998f). Neah Bay Police subsequently detained all three protesters (Mapes 1998f). Tribal members and the police confiscated the zodiac; a fourth protester waded ashore to retrieve the zodiac and was arrested. The Neah Bay Police turned all the detained individuals over to the Clallam Bay Sheriff's Office. The protesters all gave voluntary statements and were released without charges (Mapes 1998f). The tribal police established order on shore, and the crowd dispersed. Clallam Bay Sheriff's Department and the FBI conducted investigations in the following days (Mapes 1998f; Shukovsky 1998b).

A group of 30 protesters attempted a simultaneous vehicle protest on State Route 112, but Neah Bay Police stopped the protesters at the reservation boundary (Mapes 1998g). On November 5, Jean-Michel Cousteau visited the Makah Reservation and asked the Makah not to hunt; the visit was cordial by all accounts (Shukovsky and Barber 1998). On November 11, 1998, protest vessels mobilized but were responding to a false report that the Tribe was hunting and had killed and landed a whale (U.S. Coast Guard 1998). Talks between the leader of the Sea Shepherd Conservation Society and the Makah Tribal Council took place on November 24, 1998. Sea Shepherd reportedly assured the Makah that motivations were not racial, and the Makah reportedly assured Sea Shepherd that they did not intend to sell whale meat to Japan (Denn 1998a). All the protest vessels left by November 26, 1998 (The Edmonton Journal 1998). A second group of anti-whaling activists offered the Tribe monetary compensation in lieu of whaling (Denn 1998b), but the Tribe did not accept the offer (Denn 1998c).

The spring 1999 hunt began on May 10, 1999, and continued over 4 nonconsecutive days (May 10, 11, 15, and 17) in the coastal portion of the Makah U&A south of Cape Flattery (Subsection 1.4.2, Summary of Recent Makah Whaling, for a more complete description of hunting locations). On May 10, 1999, the hunt was disrupted by vessel-based protesters who maneuvered between the two Makah vessels and the whales. Protesters tried to scare the whales, and they also fired flares and smoke flares at the Makah whaling party vessels (NMFS 1999; Sunde et al. 1999; U.S. Coast Guard 1999a). Because most of the hunting occurred south of the Coast Guard's RNA, a 500-yard (457 m) MEZ around the Makah vessels was not in effect (NMFS 1999). Coast Guard officials detained two of the protesters and subsequently cited them for grossly negligent operation. The Clallam County sheriff arrested them for reckless endangerment (NMFS 1999; Sunde et al. 1999; U.S. Coast Guard 1999a). On May 11, the Makah whaling captain called off the second hunt shortly after it began because of inclement weather.

On May 15, 1999, protest vessels operated around the whalers much of the day. Two protest vessels struck whales. One vessel ran over the top of a whale and temporarily stunned it, while another vessel hit the flukes of a diving whale beside the Makah canoe (NMFS 1999). The Coast Guard cited four vessels for grossly negligent operations and/or MMPA infractions and took three of the vessels into federal custody (NMFS 1999). On May 17, 1999, the fourth and final day of the hunt, no protest vessels attempted to disrupt the hunt (U.S. Coast Guard 1999b). The Makah crew successfully landed a whale on that day. Local and regional anti-whaling activists engaged in various acts of protest after the successful 1999 hunt. Activities ranged from peaceful candlelight vigils in Seattle (Burkitt 1999b), to protests on Washington State Route 112 at the Makah Reservation boundary. The leaders of some activist groups encouraged more direct action, such as being arrested, using lock boxes (barrels filled with concrete), and lock downs (use of chains, pipes, etc. to lock individuals together) (U.S. Coast Guard 1999c).

Before the spring 2000 hunt began, protesters arrived, patrolling the coast in a 38-foot (12-m) retired Canadian search-and-rescue vessel equipped with two jet skis and carrying some of the activists who had been charged in 1999 with negligently operating a motorized vessel (Welch and Morris 2000). A group of 30 protesters also blocked road access to the Makah Reservation for about an hour in early April (Welch and Morris 2000). The spring 2000 hunt began on April 17, 2000, and covered seven nonconsecutive days (April 17 and 20; May 6, 7, 10, 12, and 29) in the coastal portion of the Makah U&A south of Cape Flattery (Subsection 1.4.2, Summary of Recent

Makah Whaling, for a more complete description of hunting locations). All hunts occurred within the Coast Guard's RNA and MEZ (Gearin and Gosho 2000), unlike spring 1999 hunts, because the southward boundary of the RNA had been extended by final rule on November 10, 1999 (64 Fed. Reg. 61209). During the first 2 days of hunting (April 17 and 20), protesters disrupted the hunts (Gearin and Gosho 2000). On April 21, Coast Guard personnel boarded two protest vessels and issued warnings (United States Coast Guard 2000). One of the vessels entered the 500-yard (457-m) MEZ on three occasions subsequent to the Coast Guard advisory and was intercepted and again warned by the Coast Guard (United States Coast Guard 2000). On at least one of these three entrances into the MEZ, the vessel entered the 500-yard (457-m) MEZ at high speed and was intercepted within 50 yards (46 m) of the Makah's canoe (Gearin and Gosho 2000). Two individuals on jet skis also entered the MEZ, making high-speed charges at the Makah canoe (U.S.Coast Guard 2000). The Coast Guard intercepted both jet skiers. One jet ski operator collided with a Coast Guard vessel and sustained shoulder injuries; Coast Guard personnel retrieved the individual from the water, placed the person under arrest, and transported her to Olympic Memorial Hospital (U.S. Coast Guard 2000). The Coast Guard also intercepted and arrested the second jet ski operator, transferring the individual to the Clallam County Sheriff's Office (U.S. Coast Guard 2000). On the 5 remaining hunting days (May 6, 7, 10, 12, and 29, 2000), one to three protester vessels were present during hunting, but they did not enter the MEZ to disrupt whale hunting.

3.15.3.5 Hunting Methods

3.15.3.5.1 <u>Vessels Associated with the Hunt</u>

The Makah traditionally hunted whales from large canoes approximately 36 feet (11 m) long and more than 5 feet (1.5 m) wide. Carvers made the canoes from a single cedar log. In present days, the Makah use both dugout and strip canoes for canoe journeys, canoe races, and other canoeing activities. In the waiver request, the Makah proposed to make the initial approach and strike the whale in their traditional hunting canoe. A more modern chase vessel (a small skiff equipped with an outboard motor) would follow the traditional canoe. The second vessel would provide a platform for tribal members (a rifleman, safety officer, and observer) who would assist in the hunt by applying additional harpoons if needed, killing a struck whale, finding a struck and lost whale, or towing a killed whale to shore. The driver of the chase boat would maneuver the rifleman to the harpooned whale to deliver a rifle shot at distances less than 30 feet (9.1 m) from the target area.

3.15.3.5.2 Weapons Associated with the Hunt

Traditionally, the Makah used wooden harpoons with mussel shell tips to strike whales. The harpoon was attached to sealskin floats and lines made of sinew and cedar to secure whales. A long wooden lance was used to kill whales. After contact with American whalers, the Makah began to use iron harpoon heads and accept tows from commercial steamers. The Makah propose to hunt gray whales using a toggle-point steel harpoon, with a rope and floats attached, to strike and secure the whale and a .50 caliber rifle to kill it. This EIS evaluates a .577 caliber rifle as an alternative rifle to kill a whale and a darting gun (with penthrite grenades) as an alternative to strike and kill a whale.

Primary Weapon Used to Strike (and Potentially Kill) Whales

Toggle-point Harpoon

A toggle-point harpoon is a wooden or metal shaft with a movable point (head) and is usually attached to a line (rope) and float. When the harpoon is thrust into a whale, the point twists horizontally (toggles) under the animal's skin. Pulling on the attached line secures the harpoon to the whale. The harpoon probably would not kill the whale, but it would be used initially to strike and secure it with the line and floats. The Makah used a toggle point harpoon with a stainless steel point to strike and secure the whale during the 1999 hunt, and their proposal is to continue using this method of striking whales.

Darting Gun (with toggle-point harpoon plus black powder or penthrite explosive projectiles)

A darting gun is a primary weapon some subsistence hunters use to strike and potentially kill whales. It is thrown by hand and consists of a steel toggle-point harpoon (connected to a line and floats) with a barrel attached to hold an explosive projectile (also referred to as a grenade, explosive charge, super bomb, and bomb lance) (O'Hara et al. 1999; Alaska Eskimo Whaling Commission 2004). A more extensive discussion of the types of explosive projectiles used in whaling follows. The steel harpoon serves the same purpose as the toggle-point harpoon described above, attaching a line and floats to the whale (and it may be desirable to attach additional floats using a toggle-point harpoon to keep a struck whale from sinking). The explosive projectile has a time-delay fuse designed to detonate after penetrating the whale; it is intended to stun or potentially kill the whale in conjunction with the first strike. Whales not killed by this first strike are killed using secondary weapons (another strike with the darting gun or the shoulder gun).

Secondary Weapon Used to Kill Whales

For most aboriginal whale hunts, secondary weapons (defined as those following the primary strike) are required to kill the whale. Secondary methods used by subsistence hunters include making additional strikes with the darting gun, shooting high caliber rifles, or firing explosive projectiles from a shoulder gun. The IWC encourages hunters to use secondary weapons for animals that move or in other ways show any signs of life as a routine precaution (IWC 2007a). The IWC has identified the appropriate target area for whales killed with rifles as the brain case (brain and upper neck) and, in emergencies, the heart. For whales killed with explosive projectiles, the appropriate target areas are the thorax and neck (IWC 2007a).

High Caliber Rifle

Several aboriginal subsistence whalers and some commercial whalers use rifles as the secondary killing method. In 1997 and 1999, the Makah Whaling Commission contracted with Dr. Allen Ingling, a University of Maryland veterinarian with a background in ballistics, to choose the optimal weapons for hunting gray whales. The Tribe's goal was to provide safe conditions for humans and to employ a humane, effective, and efficient method of killing gray whales once attached to a line and floats. Dr. Ingling and the Makah investigated the performance of several firearms, including the Garand 30'06, Winchester .458 Magnum, Weatherby .460 Magnum, State Arms and LAR .50BMG, and the .577 A-Square Tyrannosaur. Participants assessed the weapons for efficiency, safety, and humaneness by testing the depth of penetration of bullets in a water tank and evaluating weight, recoil, and loading ease (Ingling 1997; Ingling 1999). All of the weapons could kill a whale, based on test results, but participants selected the highest caliber rifles, the .50BMG and .577 A-Square Tyrannosaur, as the best options (Ingling 1999), primarily because the bullets would penetrate deeper in water, allowing a larger margin of error in targeting. The Tribe ultimately used the .577 A-Square Tyrannosaur in the 1999 hunt, because it was 6 pounds (2.7 kg) lighter that the .50BMG, it had a 3-round rather than single-shot capacity, and its shots reached the maximum penetration in water tank tests (Ingling 1999).

In NMFS' 2001 EA (NMFS 2001a), reports indicated that no data on ricochet were available from the Army's .50BMG Field Manual (United States Army 1991). During a public comment period, NMFS received a report from Kline Engineering Company (Kline 2001) that assessed ricochet data, ricochet probability, and modeled trajectories for .50 caliber M33 rounds fired against sand. Kline (2001) concluded that no firings should be conducted within 6,670 yards (6,099 m) from shore and advised that a ricochet could travel almost 1,860 yards (1,700 m) off the line of fire. Subsequent to the Kline report, Beattie Natural Resources Consulting assessed the public safety of the 1999 hunt, specifically, the potential for injury or death from rifle fire to non-participants in the hunt. Beattie (2001) disagreed with Kline's earlier conclusions about a safety zone, but agreed there was a potential for missed shots to ricochet. Beattie (2001) made the following recommendations to enhance public safety of the hunt in the Strait of Juan de Fuca:

- Riflemen should have to use either a .50 caliber or .577 caliber rifle as the primary rifle.
- A rifleman should not shoot if the intended target is more than 30 feet (9.1 m) from the muzzle of the rifle [to ensure that misses do not occur and to reduce the possibility of a ricochet].
- A rifleman should fire only at a downward angle [because a harpooned whale could surface at the top of a swell while the chase boat was in a position toward the middle of the trough or swell. In that situation, firing a shot might result in the unimpeded travel of the projectile toward the boundary of the MEZ, should the shot miss the whale and water].
- The Makah Whaling Commission should use simulated hunting conditions to document the riflemen's proficiency using rifles actually employed during whale hunting.
- There must be minimum visibility of 500 yards (457 m) in all directions when it is harpooned (to eliminate problems with the boats entering the 500-yard (457-m) MEZ because of low visibility).
- Where Highway 112 closely parallels the shoreline, the rifleman on the chase boat should fire at a whale with the rifle pointed away from the shoreline if the harpooned whale is within 500 yards (457 m) of the shoreline.
- The diver on the chase boat should be the designated safety officer for the hunt (because the diver does not have another assignment or responsibility until others kill the whale). The diver should be assigned the sole task of monitoring safety conditions within the MEZ to ensure that the rifleman has a clear field of fire.

In 2004, NMFS contracted experts in military firearms training and technological capabilities to review all relevant public safety issues surrounding the conduct of Makah whale hunts, including the information presented in Kline (2001) and Beattie (2001). These experts confirmed the selection of the .50 caliber rifle as the weapon of choice, over the .577 A-Square, because it combines high power with consistently manufactured, commercial grade ammunition (Graves et al. 2004; Graves and Hazelton 2004). Graves et al. (2004) also conducted ricochet and range experiments on still water using similar weapons. They concluded that shots fired below an elevation angle of -6.2° (that is, with the gun pointed downward at the target in the water and below the shooter's horizon by at least 6.2 degrees) will ensure a very low probability of ricochets. Moreover, the probability of a ricochet declines to zero when shots are kept below the elevation angle, but wave height is greater, because wave changes in the surface geometry vastly reduce the surface area (i.e., wave tops) that can cause ricochets (Graves et al. 2004). Graves et al. (2004) also recommended that all persons near the hunt wear eye and double ear protection (i.e., earplugs and shooting muffs) when firing the rifle. This recommendation might conflict with that of Beattie (2001), which requires the rifleman to communicate verbally with the safety officer.

Explosive Projectiles (grenades)

Explosive projectiles for killing whales may contain either black powder or penthrite. Currently, only darting guns have been modified to accommodate penthrite projectiles. The projectile is aimed at the neck and thoracic regions and kills the whale by damaging internal organs, either with the shock wave of the blast or tearing of tissues and hemorrhage caused by shrapnel (O'Hara et al. 1999). For each type of grenade, whether used with a hand-thrown darting gun or a shoulder gun, the grenades are very similar in shape (Øen 1995).

Black powder grenades are approximately 11.2 inches (28 cm) long and 0.9-inch (.2 cm) in diameter. The black powder in the grenade is a mixture of sulfur, saltpeter, and charcoal (Øen 1995; O'Hara et al. 1999), which explodes when ignited. Alaska Eskimos have used black powder grenades in hand-thrown darting guns in the bowhead hunt for approximately 150 years (Alaska Eskimo Whaling Commission 2006) and more recently in shoulder guns. The grenade's time-delayed fuse is designed to ignite in the barrel and detonate the grenade after it enters the whale's body. If the gun jams or the projectile detonates prematurely, it can cause a dangerous explosion on the whaling vessel (O'Hara et al. 1999). Øen reported that 18 percent of the black powder grenades malfunctioned (1995) in the 1984 to 1986 bowhead hunting seasons, though he did not describe the nature of the malfunctions. Black powder burns slowly, and less than half converts to gas (North Atlantic Marine Mammal Commission 2004). Black powder is also very sensitive to friction and electricity. Several accidents have occurred during production and the use of black powder. It is now classified as explosive, and storage and sale are entirely banned in some communities (North Atlantic Marine Mammal Commission 2004).

The penthrite grenade uses penthrite as the explosive material. A penthrite grenade consists of a tubular body that holds a charge (the penthrite), has a head with a firing mechanism, and contains safety devices. The time-delayed fuse on the penthrite grenade ignites after the grenade penetrates the whale, in contrast to the black powder grenade, which ignites in the barrel, reducing the risk of an explosion on the whaling vessel (Øen 2000). Numerous other grenade safety features are intended to prevent injury to whalers (Øen 2000). Penthrite combusts nearly instantaneously and provides substantially larger explosive power than black powder (Øen 2000). Reflecting use of advanced design and materials, a single penthrite projectile currently costs $1,000 (IWC 2007a).

The Alaska Eskimo Whaling Commission Weapons Improvement Program Committee worked with cooperating scientists from Norway on the design, testing, and manufacture of penthrite between 1987 and 1998. The participants' intent was to adapt penthrite grenades used in commercial whaling for use in the darting guns used by Alaska whalers (Alaska Eskimo Whaling Commission 2006). In 2004, the Alaska Eskimo Whaling Commission, working in conjunction with the Norwegian government, developed a safety handbook and training video regarding the function and proper use of the penthrite projectile. Whaling captains must complete training and obtain certification in the use of the penthrite projectile and modified darting gun barrel. Currently, all but three of the Alaska Eskimo Whaling Commission's villages have received training in the use of the new equipment (IWC 2012h).

It is uncertain whether penthrite grenades would be readily available for a Makah Tribe gray whale hunt. As noted above, the projectiles are expensive and the new darting guns can also cost approximately $1,000 apiece, not including extremely high shipping costs (IWC 2012h). It is also unclear how easily the Tribe could obtain the grenades; currently the Alaska Eskimo Whaling Commission imports its penthrite projectiles from a Norwegian manufacturer, but is consulting with the U.S. Department of Homeland Security to determine if it is possible to manufacture them domestically (IWC 2012h).

Some aboriginal subsistence whalers use shoulder guns to deliver explosive projectiles intended to kill a whale that has already been struck with a harpoon with an attached line and floats. A shoulder gun is generally a smooth bore seven or eight gauge weapon fired from the shoulder like a shotgun. Like a shotgun, it uses gunpowder to launch the projectile at the target. Although Øen (1995) recommended development of a shoulder gun capable of delivering a penthrite grenade, no shoulder guns adapted for this projectile currently exist.

3.16 Human Health

3.16.1 Introduction

The following sections describe health-related issues related to the handling and eating of whales and whale food products.

3.16.2 Regulatory Overview

The Makah Tribal Council has developed a health code in recognition of the need for delivery of comprehensive health services to tribal members and their families. Title I, Policy, states that these codes apply uniformly throughout the Makah Indian Reservation to help tribal members achieve the health status of the general population and to increase effectiveness and efficiency of services offered within the reservation. The Makah Health Code offers a framework for decision-making related to health issues. None of the provisions relates to subsistence use of whales.

3.16.3 Existing Conditions

3.16.3.1 Nutritional and Health Benefits from Consuming Whale Food Products and Other Traditional Subsistence Foods

Historically, whale oil and whale products were important nutritional components of the diet of the Makah Tribe. They also played an important role in the Makah's cultural and spiritual well being (Subsection 3.10.3.5, Contemporary Makah Society, for a description of the Makah Tribe's subsistence consumption). Whale oil, in particular, was widely used, because it did not spoil as quickly as whale meat. Early archaeological studies indicated that as much as 84 percent of the Makah diet was whale meat, oil, and other food products (Huelsbeck 1994). The Makah currently and historically have used the following whale products (Renker 2012): raw blubber, oil rendered from whale blubber, organ meats (e.g., brain, heart), and muscle tissue from all parts of the whale (including around the jaw and under the eye). They use the rich oil for cooking and flavoring foods, as well as for ceremonial purposes (Renker 2012).

The introduction of the western diet (i.e., refined sugar and flour, beef, vegetable oil and lard, etc.) and the reduction in subsistence foods have been linked to poor health in Native American populations (Budowski 1988; Simopoulos 1999; Renker 2012) and also in Alaska Eskimos (IWC 1979b; Ebbesson et al. 2005a). The Makah Tribe, however, continues to consume large quantities of marine fish and shellfish, and this longstanding reliance on marine foods (including whale products) resulted in a diet with a narrow nutritional base. On average, Makah consume 126 pounds (57 kg) per capita per year (5.5 ounces [156 g] per day) of finfish and shellfish (Sepez 2001). Sepez (2001) also calculated that the whale products (blubber and meat) consumed in 1999 equaled about 2.4 pounds (1.1 kg) per capita and that an additional amount was consumed at the community potlatch. For comparison, Renker (2012) calculated that harvesting an average of four gray whales per year would yield 8 to 20 pounds (4 to 9 kg) of meat per Makah and 16 to 20 pounds (7 to 20 kg) of oil or blubber per Makah (and a somewhat smaller amount of whale oil after rendering).

General nutritional components of whale meat[76] and other protein sources are compared in Table 3-46. Nutritional data are from the United States Department of Agriculture National Nutrient Database for Standard Reference (U.S.Department of Agriculture 2011). With the exception of whale oil and blubber, whale products have a similar nutritional profile (e.g., calories, protein, fat, and calcium) as other finfish, shellfish, wild game, and domestic meats. Whale oils and blubber provide a richer source of energy (calories) than other food types listed in Table 3-46, and whale meat has higher levels of iron. Whale oil is a good source of vitamin E (an antioxidant) and whale meat is a good source of selenium, both of which may play a role in protecting against the toxicity of certain seafood contaminants like mercury (Arnold and Middaugh 2004). Overall, however, it is difficult to compare essential nutrients and minerals of whale products directly to other protein sources because the former have not been studied extensively.

In addition to providing protein and energy, marine foods also contain essential vitamins, minerals, and lipids. Essential lipids include polyunsaturated fatty acids, which are important components of both whale and fish oils and are high in omega-3 polyunsaturated fatty acids (e.g., alpha-linolenic acid, eicosapentaenoic acid, docosapentaenoic acid, and docosahexenoic acid). These essential fatty acids improve or prevent symptoms associated with coronary heart disease, hypertension, Type 2 diabetes, kidney disease, rheumatoid arthritis, Crohn’s disease, and chronic obstructive pulmonary disease (Budowski 1988; Simopoulos 1999; Simopoulos 2002; Holub and Holub 2004; Ebbesson et al. 2005a; Ebbesson et al. 2005b; Ebbesson et al. 2005c; Reynolds et al. 2006).

The human body does not naturally produce essential polyunsaturated fatty acids, so they must come from food consumed. Polyunsaturated fatty acids exist in a variety of food sources, including fish oils, vegetable oils (e.g., soybean), nuts, and meat from terrestrial or marine mammals (e.g., whales), and vitamin supplements (National Academy of Sciences 2005).

Studies of subsistence populations that consume higher quantities of seafood than the general United States population, and consequently ingest higher levels of omega-3 fatty acids, suggest that these populations have lower rates of heart disease than the general population (Dewailly et al. 2001; McLaughlin et al. 2005). For example, McLaughlin et al. (2005) found that

[76] Whale food products’ nutritional information shown in Table 3-46 includes data for bowhead and minke whales (both baleen whales like the gray whale) and beluga (a toothed whale distinct from baleen whales).

Alaska Natives with high dietary intake of polyunsaturated fatty acids (evidenced by higher tissue levels of polyunsaturated fatty acids) had lower heart disease mortality than non-natives.

Ebbesson et al. (2005b) measured fatty acid concentrations in Norton Sound (Alaska) Eskimos and screened for insulin resistance and diabetes. Findings indicated that high consumption of omega-3 fatty acids positively affected insulin sensitivity and glucose tolerance. Osterud et al. (1995) studied healthy men and women given supplements of oils (15 milliliters [mL]/day) from the blubber of seal, cod liver, and Minke whale for 10 weeks. Supplementation of the diet, especially with whale oil, had beneficial effects on biological measures associated with cardiovascular and thrombotic diseases.

Reynolds et al. (2006) reported on the high levels of omega-3 fatty acids in bowhead whale blubber consumed by Alaska Natives. The high levels of omega-3 fatty acids in the blubber and other marine mammal food products confer considerable health benefits on subsistence consumers and are important in the treatment or prevention of insulin resistance, diabetes, elevated blood pressure, cardiovascular disease, arthritis, and stroke (Reynolds et al. 2006).

Seafood diets containing essential polyunsaturated fatty acids are also beneficial for women at risk for hypertension during pregnancy (Popeski et al. 1991) and may prolong gestation and increase birth weight (Olsen et al. 1993; Grandjean et al. 2001). There was, however, a limit to the observed positive effects on birth weight, as researchers did not find increased weights at higher intake levels (greater than three fish meals per week) of essential fatty acids (Olsen et al. 1993; Grandjean et al. 2001). The National Academy of Sciences (2013) recommends dietary intake of polyunsaturated fatty acids (i.e., alpha-linolenic acids) at 0.5 grams/day (infants), 0.7 to 0.9 grams/day (children), and 1.0 to 1.6 grams/day (adults).

Table 3-46. U.S. Department of Agriculture (USDA) nutritional values for selected food types.

Food Type	Energy (calories /100g)	Protein (g/100g)	Calcium (mg/100g)	Iron (mg/100g)	Selenium (µg/100g)	Vitamin A (IU/100g)	Vitamin E (mg/100g)	Vitamin B6 (mg/100g)	Vitamin B12 (µg/100g)	Total Fat (g/100g)	Total Saturated Fat (g/100g)	Total Mono-unsaturated Fat (g/100g)	Total Poly-unsaturated Fat (g/100g)
Whale													
Beluga meat, raw	111	26.5	7	25.9	36.5	340	n/a	0.05	2.59		0.092	0.337	0.025
Beluga oil	900	0	0	0	3.0	2310	8.27		0	100	14.49	54.19	10.8
Beluga eyes	291	19.6	n/a	n/a	n/a	1870	n/a	n/a	n/a 0.5	23.3		n/a	n/a
Beluga flipper, raw	271	19.0	11	2.8	n/a	930	n/a	n/a	n/a	21.7	n/a	n/a	n/a
Beluga liver, raw	117	18.4	11	n/a	n/a	22100	n/a n/a	n/a	n/a	3.9 n/a	n/a	n/a	n/a
Bowhead skin and subcutaneous fat [1]	465	12.6	5	n/a	n/a	750	n/a	n/a	n/a	46.1	6.56	28.12	7.97
Bowhead meat [2]	n/a	26.2 [2]		14.1 [2]		330 [2]		n/a	n/a	2.6 [2]		n/a	n/a
Bowhead oil	900	0	0	0	n/a	2810	n/a	n/a	n/a	100	n/a	n/a	n/a
Bowhead blubber	870	0.4 n/a	n/a	0.5 n/a	n/a	n/a n/a	n/a	n/a	n/a	96.5n/a	n/a	n/a	n/a
Minke skin and subcutaneous fat, raw [1]	n/a	n/a	n/a	n/a	6.28[4]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Minke lean meat [3]	116	24.8	4.1	8.54	0.21[4]	n/a	n/a	n/a	n/a	1.2	18.5	49.2	21
Fish and Shellfish													
Salmon, Chinook, raw	179	19.9	26	0.3	36.5	453	1.22	0.4	1.3	10.4	3.1	4.4	2.8

Food Type	Energy (calories /100g)	Protein (g/100g)	Calcium (mg/100g)	Iron (mg/100g)	Selenium (µg/100g)	Vitamin A (IU/100g)	Vitamin E (mg/100g)	Vitamin B6 (mg/100g)	Vitamin B12 (µg/100g)	Total Fat (g/100g)	Total Saturated Fat (g/100g)	Total Mono-unsaturated Fat (g/100g)	Total Poly-unsaturated Fat (g/100g)
Salmon, coho, wild, raw	146	21.6	36	0.6	36.5	135	0.73	0.55	4.17		1.26	2.13	1.99
Salmon, sockeye, raw	142	21.3	10	0.4	33.7	193	0.95	0.61	5.95 5.9		1.18	1.86	1.95
Halibut, raw	116	20.5	20	0.3	36.5	157	1.9	0.39	1.78	2.9	0.73	1.20	0.91
Crab, Dungeness, raw	86	17.4	46	0.4	37.1	90	n/a	0.15	9.0 5.6		0.12	0.17	0.32
Wild Game									1.0				
Elk, meat, raw	111	23.0	4	2.8	9.8	0	n/a	n/a	n/a	1.5	0.53		0.30
Deer, meat, raw	120	23.0	5	3.4	9.7	0	0.2	0.37	6.31		0.95	0.67	0.47
Domestic Meat									2.4		0.36		
Beef, composite of trimmed retail cuts, trimmed to 1/2-inch fat, prime, raw	265	18.7 7		1.8	18.7 0		n/a	0.39	2.84	20.5	18.37	8.87	0.76
Chicken, breast, meat and skin, raw	172	20.9	11	0.7	16.6	83	0.31	0.53	0.34		2.66	3.82	1.96

n/a = Data are not available.

9.3

[1] This type of tissue is referred to by several different names (population specific), including maktak, muktuk or mattak. (g) = grams, (mg) = milligrams, (ug) = micrograms, (IU) = international units

Sources: U.S. Department of Agriculture National Nutrient Database http://ndb.nal.usda.gov/; [2] IWC 1979b; [3] Suzuki 1993; [4] Hansen et al. 1990.

In summary, the many benefits associated with consuming marine seafood products, including whale, are well documented in the scientific literature. Marine mammal food products are rich with many of the same nutrients found in commonly consumed seafood products (fish and shellfish), and, in the case of some minerals and vitamins, marine mammal products provide an even richer source.

3.16.3.2 Environmental Contaminants in Gray Whales

While there is documented evidence of the beneficial effects of the nutrients in marine foods, persistent and potentially toxic chemicals also occur and are documented in the diets of native subsistence populations (Verbrugge and Middaugh 2004; Arnold and Middaugh 2004). In considering the type and amount of chemicals the Makah could ingest by consuming whale products, their continuing exposure to these contaminants is also a result of their ongoing, high consumption of other seafood products, including finfish and shellfish. Numerous researchers have documented concentrations of organic and inorganic contaminants in the tissues (blubber, muscle, organs, etc.) of the gray whales proposed for hunting by the Makah (Varanasi et al. 1994; Jarman et al. 1996; Krahn et al. 2001; Mendez et al. 2002; Ruelas-Inzunza and Paez-Osuna 2002; Tilbury et al. 2002; Ruelas-Inzunza et al. 2003; Dehn et al. 2006a; Dehn et al. 2006b).

Whale habitat and migration patterns should be considered when evaluating contaminant concentrations because these factors may affect the magnitude of contaminant concentrations (Houde et al. 2005). The concentration of contaminants in whale tissues will also vary based on the feeding habits of the whale (Houde et al. 2005) and whether the whale is freshly killed or stranded. Gray whales targeted by the Makah filter their food using the bony baleen plates located in their mouths (Vaughn 1978). Typically, this food consists of plankton and other micro- and macrofauna (Vaughn 1978). The levels of contaminants it contains are often lower because of the lesser position of these fauna in the overall marine food chain. Therefore, data on contaminant concentrations in whales that use other feeding strategies, such as toothed whales feeding on larger, older fish that accumulate greater levels of chemicals, are not presented here because they have less relevance to the types of whale (or associated contaminant levels) that are hunted by the Makah (i.e., gray whales). Distinctions are made between contaminant levels in freshly harvested versus stranded whales, because they are often lower in freshly harvested whales than in stranded whales (Rugh et al. 1999; Krahn et al. 2001).

As previously discussed, the Makah Tribe historically consumed large quantities of whale meat and blubber and, to a lesser extent, other portions of the whale (Renker 2012). In the past decade, the Makah have consumed much smaller quantities of whale products (i.e., on a total biomass basis) compared with historical times. The animals consumed include both stranded as well as one freshly harvested animal following the 1999 hunt (Subsection 3.16.3.1, Nutritional and Health Benefits from Consuming Whale Food Products and Other Traditional Subsistence Foods).

The remainder of this section focuses on describing chemical concentrations measured in whale meat (muscle) and blubber because these are the parts of the whale that are most often consumed. Renker (2012) estimated that harvesting an average of four gray whales per year could yield 24 to 40 pounds (11 to 18 kg) of meat and blubber per Makah. A summary of contaminant concentrations in gray whale blubber and muscle tissue is presented in Table 3-47. Organic compounds (e.g., PCBs, pesticides, and dioxins) are associated predominantly with whale blubber because these compounds are lipophilic (i.e., easily dissolved in lipids or fat). Mean blubber concentrations of chlordanes, DDTs, dieldrin, hexachlorobenzene, mirex, and PCBs in gray whales collected during subsistence hunts (Russian) in the Bering Sea in 1994 (Krahn et al. 2001) (Table 3-47) were 150, 150, 77, 230, 1.6, and 630 micrograms per kilogram (μg/kg) wet weight, respectively. These concentrations tended to be two to three times lower than those measured in stranded gray whales collected over the 1990s in Washington (Table 3-47), indicating that contaminant concentrations may be higher in diseased or aged whales, or in animals in poor nutritional health, that may strand in the Puget Sound region (Table 3-47). Ylitalo (2008) found that elevated concentrations of organochlorine contaminants in the tissues of stranded juvenile gray whales were most likely a result of retention of these chemicals in blubber of the stranded animals as lipid stores were depleted for energy use rather than from a difference in diet or feeding areas. Concentrations of PCBs (1,200 μg/kg wet weight) and DDTs (520 μg/kg wet weight) in blubber of the whale harvested by the Makah Tribe in 1999 were, however, higher than the mean levels reported in stranded gray whales or in those hunted in the Bering Sea (Ylitalo et al. 1999).

Concentrations of persistent organic pollutants (POPs) in whale blubber typically were higher or comparable to those in other tissues (e.g., muscle, liver, kidney, or brain) (Krahn et al. 2001). Concentrations of DDTs, hexachlorobenzene, and PCBs measured in biopsy blubber samples using a dart collection method on live whales from Washington State waters tended to be lower than those measured from subsistence or stranded samples (Table 3-47). Jarman et al. (1996) found mostly non-detected concentrations (less than 0.002 μg/kg wet weight) of dioxins in two gray whales that stranded off of California. The concentrations of certain classes of POPs in gray whales typically are lower than in other whale species (Varanasi et al. 1994; Jarman et al. 1996; Krahn et al. 2001; Tilbury et al. 2002; Fossi et al. 2012). However, concentrations for some of these contaminants in whale blubber can be quite high, resulting in quite low “allowable consumption rates.” For example, the unweighted average PCB concentration for the 11 gray whale blubber samples in Table 3-47 is 440 µg/kg. While the Washington State Department of Health has not developed screening levels for gray whale blubber[77], this value - combined with the estimated per capita blubber consumption rates in the Tribe’s needs statement (approximately 20-25 grams/day; Renker 2012) and other values applied by the Washington Department of Health (e.g., an 8-oz [227-gram] meal size) - yields a calculated “allowable consumption rate” of 0.43 meals of blubber per month. This level would likely result in a ‘no consumption’ recommendation by the Washington State Department of Health. The lowest PCB concentration observed in gray whale blubber (137 µg/kg) would yield an allowable consumption rate of 1.34 meals of blubber per month, which would likely result in a recommended maximum of one 8-oz (227 gram) meal per month (D. McBride, Washington State Department of Health, pers. comm., September 30, 2014)[78]. While the number of blubber samples is not large and it is possible that PCB concentrations may vary by the area/depth of blubber sampled on each animal, these are the best data available for our analysis.

Few measurements of metal concentrations are available for blubber or muscle of gray whales, and those available are from stranded whales (Mendez et al. 2002; Ruelas-Inzunza and Paez-Osuna 2002; Rueles-Inzunza et al. 2003). Metal concentrations typically are higher in muscle tissue compared to whale blubber (

[77] A screening level is defined by the Washington State Department of Health (2012b) as the concentration of a particular chemical that is of potential public health concern; it is a threshold value against which tissue residue levels of the contaminant can be compared. In determining screening levels for fish flesh, the Washington State Department of Health uses a “general screening level” which reflects the risks borne by the general population as a result of consuming contaminated fish, and a “subsistence screening level” which accounts for the greater risk (i.e., relatively higher body burdens of bioaccumulative contaminants) incurred by subsistence fishers that rely on noncommercial caught fish and shellfish as a major source of protein in their diets.

[78] Allowable consumption rates are simplified by rounding the calculated value to the whole number closest to 0, 1, 2, 4, or 8 meals per month. These conclusions are based on calculations using non-cancer endpoints; calculations based on cancer endpoints would be more restrictive and yield lower recommended consumption rates. The Washington State Department of Health's current practice is to develop health advisories for fish flesh based on non-cancer endpoints.

Table 3-48). Mean concentrations (in µg/kg dry weight) of metals in muscle tissue from various studies range from 0.4 to 0.86 cadmium, 3.1 to 4.1 copper, 305 to 1,009 iron, 0.6 to 1.11 lead, 0.33 to 0.8 manganese, 0.145 mercury, 1.39 nickel, and 120 to 279 zinc. Methyl mercury composed approximately 75 percent of the total mercury measured in gray whale muscle (Ruelas-Inzunza et al. 2003). Metal concentrations typically were higher in liver and kidney tissues than in muscle or blubber tissues (Mendez et al. 2002; Ruelas-Inzunza and Paez-Osuna 2002; Ruelas-Inzunza et al. 2003). Metal concentrations were not reported for the whale the Makah Tribe harvested in 1999.

Since 1998, Chukotka Natives have been reporting a number of hunted whales from the Bering Sea that exhibit a strong medicinal odor, referred to as the 'stinky whale' phenomenon (IWC 2007b). From 2008 through 2012, 1 to 8 stinky whales (approximately 1 to 6 percent of whales landed) have been reported by Chukotka Natives each year (Ilyashenko 2013). Tissues from these whales have been deemed inedible by hunters. In some cases, people who have tasted the blubber or meat have reported symptoms of numbness of the oral cavity, skin rashes, or stomach aches. Toxicologists have recommended that such whales be considered unfit for human consumption (Ilyashenko 2008).

No known cause has been found, but research is ongoing to determine whether the smells are caused by chemical contaminants, disease, or other factors. Analyses of tissue samples from whales taken in Russian aboriginal hunts found that the concentrations of organochlorines, polyaromatic hydrocarbons, trace elements, and stable isotopes in the tissue of stinky whales fell within the ranges of the concentrations of those substances in non-stinky whales (Rowles and Ilyashenko 2008). In contrast, the concentrations of ketones, aldehydes, and some alcohols in tissue samples from stinky whales were higher compared to samples from non-stinky whales. Some of the compounds may have been lost or changed in concentration because of the repeated freezing and thawing of the samples prior to analysis or other aspects of sample handling (Rowles and Ilyashenko 2008). In a study of free-ranging gray whales in their winter range, Gulland et al. (2008) found elevated levels of ketones, aldehydes, and alkenes in breath samples collected from adult females with calves. Those results were interpreted as indicating malnourishment in the animals sampled. Using the preliminary tissue sample analysis results and assuming that the detected compounds are responsible for the stinky condition noted in living whales, scientists developed two hypotheses to potentially explain the presence of high concentrations of various compounds in stinky whale tissues. One possible explanation is that the odor is related to diet. For example, all stinky whales that have been landed had seaweed in their stomachs. This may indicate a mechanism mediated through the digestion of seaweed or other organisms attached to the seaweed (Ilyashenko 2008). It has also been observed that some stinky whales had recently consumed arctic cod, which is unusual for gray whales. Notably, these items have not been observed in the stomachs of non-stinky whales or in stranded gray whales along the U.S. coast (Rowles and Ilyashenko 2008). An alternative explanation is that certain bacteria, fungi, and/or biotoxins may contribute to elevated levels of odiferous compounds found in these whales (Ilyashenko 2008). Based on their analysis of tissues gathered from 2005 through 2011, Polyakova et al. (2012) suggested that the most likely source of the odor was petroleum hydrocarbon contaminants in waters used by gray whales.

Table 3-47. Concentrations of organic compounds measured in freshly harvested and stranded gray whale tissues.

Organic Compound	Concentration in Blubber (µg/kg-ww)[1]	Concentration in Muscle (µg/kg-ww)[1]	Comment	Reference
Chlordane	150 ± 21	1± 0.2	Tissue from subsistence hunts (Russian Bering Sea 1994)	Krahn et al. 2001; Tilbury et al. 2002; Varanasi et al. 1994; Ylitalo, G., Northwest Fisheries Science Center, pers. comm/unpublished data, July 18, 2014)
	340 ± 120	NA	Tissue collected from stranded whales (1988 to 1991)	
	11 ± 9.3	NA	Tissue biopsies from live whales in AK (2010)	
	24 ± 15	NA	Tissue biopsies from live whales in BC/WA/OR (2010)	
	58 ± 30	NA	Tissue biopsies from live whales in CA (2010)	
DDTs	130 ± 26	NA	Tissue biopsies from live whales in WA State (1996 to 1998)	Krahn et al. 2001; Tilbury et al. 2002; Varanasi et al. 1994; Ylitalo et al. 1999 ; Calambokidis and Huggins 2008; Ylitalo, G., Northwest Fisheries Science Center, pers. comm/unpublished data, July 18, 2014)
	150 ± 32	1± 0.2	Tissue from subsistence hunts (Russian Bering Sea 1994)	
	450 ± 140	NA	Tissue collected from stranded whales (1988 to 1991)	
	240 ± 44	NA	Tissue collected from stranded whales (1999)	
	520	3.2	Tissue from the Makah whale hunt (1999)	
	90	NA	Tissue collected from stranded whales (Central Puget Sound 2004 to 2007)	
	299	NA	Tissue collected from stranded whales and live whale biopsies (Northern Puget Sound 2004 to 2007)	
	191	NA	Tissue collected from stranded whales (Outer WA/OR coast 2004 to 2007)	
	16 ± 11	NA	Tissue biopsies from live whales in AK (2010)	
	100 ± 65	NA	Tissue biopsies from live whales in BC/WA/OR (2010)	
	410 ± 260	NA	Tissue biopsies from live whales in CA (2010)	
Dieldrin	77 ± 14	NA	Tissue from subsistence hunts (Russian Bering Sea 1994)	Krahn et al. 2001; Varanasi et al. 1994 ; Ylitalo, G., Northwest Fisheries Science Center, pers. comm/unpublished data, July 18, 2014)
	160 ± 72	NA	Tissue collected from stranded whales (1988 to 1991)	
	2.1 ± 3.1	NA	Tissue biopsies from live whales in AK (2010)	
	5.2 ± 4.2	NA	Tissue biopsies from live whales in BC/WA/OR (2010)	
	10 ± 5.1	NA	Tissue biopsies from live whales in CA (2010)	
Hexachlorobenzene	100 ± 41	NA	Tissue biopsies from live whales in WA State (1996 to 1998)	Krahn et al. 2001; Tilbury et al. 2002; Varanasi et al. 1994; Ylitalo, G., Northwest Fisheries Science Center, pers. comm/unpublished data, July 18, 2014)
	230 ± 32	2 ± 1	Tissue from subsistence hunts (Russian Bering Sea 1994)	
	350 ± 130	NA	Tissue collected from stranded whales (1988 to 1991)	
	510 ± 130	NA	Tissue collected from stranded whales (1999)	
	11 ± 9.5	NA	Tissue biopsies from live whales in AK (2010)	
	13 ± 14	NA	Tissue biopsies from live whales in BC/WA/OR (2010)	
	21 ± 10	NA	Tissue biopsies from live whales in CA (2010)	

Organic Compound	Concentration in Blubber (µg/kg-ww)[1]	Concentration in Muscle (µg/kg-ww)[1]	Comment	Reference
Mirex	1.6 ± 0.2	NA	Tissue from subsistence hunts (Russian Bering Sea 1994)	Krahn et al. 2001; Varanasi et al. 1994
	14 ± 4.6	NA	Tissue collected from stranded whales (1988 to 1991)	
	0.2 ± 0.4	NA	Tissue biopsies from live whales in AK (2010)	
	0.3 ± 0.4	NA	Tissue biopsies from live whales in BC/WA/OR (2010)	
	1.1 ± 0.2	NA	Tissue biopsies from live whales in CA (2010)	
PCBs	220 ± 42	NA	Tissue biopsies from live whales in WA State (1996 to 1998)	Krahn et al. 2001; Tilbury et al. 2002; Varanasi et al. 1994; Ylitalo et al. 1999; Calambokidis and Huggins 2008; Ylitalo, G., Northwest Fisheries Science Center, pers. comm/unpublished data, July 18, 2014)
	630 ± 82	9 ± 2	Tissue from subsistence hunts (Russian Bering Sea 1994)	
	970 ± 240	NA	Tissue collected from stranded whales (1988 to 1991)	
	600 ± 130	NA	Tissue collected from stranded whales (1999)	
	1200	12	Tissue from the Makah whale hunt (1999)	
	137	NA	Tissue collected from stranded whales (Central Puget Sound 2004 to 2007)	
	415	NA	Tissue collected from stranded whales and live whale biopsies (Northern Puget Sound 2004 to 2007)	
	246	NA	Tissue collected from stranded whales (Outer WA/OR coast 2004 to 2007)	
	39 ± 24	NA	Tissue biopsies from live whales in AK (2010)	
	110 ± 70	NA	Tissue biopsies from live whales in BC/WA/OR (2010)	
	270 ± 140	NA	Tissue biopsies from live whales in CA (2010)	
PCDDs/PCDFs	<0.002	NA	Concentrations measured in tissue (1987 to 1988)	Jarman et al. 1996
2,3,7,8-TCDD	<0.002 – 0.003	NA	Concentrations measured in tissue (1987 to 1988)	
2,3,7,8-TCDF				

[1] Values represent the mean ± the standard error of the mean µg/kg – micrograms per kilogram.

ww wet weight
NA Not Available
DDT Dichloro-Diphenyl-Trichloroethane
PCB Polychlorinated Biphenyl
PCDD Polychlorinated Dibenzodioxin
PCDF Polychlorinated Dibenzofuran
TCDD Tetrachlorodibenzodioxin
Tetrachlorodibenzofuran

Source: see reference column.

TCDF

Table 3-48. Concentrations of metal/metalloid(s) measured in freshly harvested and stranded gray whale tissues.

Metal/Metalloid	Concentration in Blubber (ug/kg-dw)[1]	Concentration in Muscle (ug/kg-dw)[1]	Comment	Reference
Cadmium	0.16	0.86 ± 1.05	Tissue collected from stranded whales (1999)	Mendez et al. 2002
	NA	0.4 ± 0.2	Tissue collected from stranded whales (1999)	Ruelas-Inzunza and Paez-Osuna 2002
	NA	0.02 + 0.002	Tissue collected from harvested whales (2001)	Dehn et al. 2006
Copper	1.72 ± 0.90	3.10 ± 1.65	Tissue collected from stranded whales (1999)	Mendez et al. 2002
	NA	4.1 ± 1.7	Tissue collected from stranded whales (1999)	Ruelas-Inzunza and Paez-Osuna 2002
	NA	3.17 ± 0.62	Tissue collected from harvested whales (2001)	Dehn et al. 2006
Iron	28.9 ± 14.7	305 ± 217	Tissue collected from stranded whales (1999)	Mendez et al. 2002
	NA	1009 ± 802	Tissue collected from stranded whales (1999)	Ruelas-Inzunza and Paez-Osuna 2002
Lead	1.06 ± 0.73	1.11 ± 0.69	Tissue collected from stranded whales (1999)	Mendez et al. 2002
	NA	0.6 ± 0.4	Tissue collected from stranded whales (1999)	Ruelas-Inzunza and Paez-Osuna 2002
Manganese	0.44 ± 0.13	0.33 ± 0.22	Tissue collected from stranded whales (1999)	Mendez et al. 2002
	NA	0.8 ± 0.1	Tissue collected from stranded whales (1999)	Ruelas-Inzunza and Paez-Osuna 2002
Mercury	NA	0.145 ± 0.082	Tissue collected from stranded whales (1999)	Ruelas-Inzunza et al. 2003
	NA	0.02 ± 0.002	Tissue collected from harvested whales (2001)	Dehn et al. 2006
Methyl mercury	NA	0.109 ± 0.040	Tissue collected from stranded whales (1999)	Ruelas-Inzunza et al. 2003
Nickel	1.10 ± 0.60	1.39 ± 0.79	Tissue collected from stranded whales (1999)	Mendez et al. 2002
Selenium	NA	0.19 ± 0.01	Tissue collected from harvested whales (2001)	Dehn et al. 2006
Silver	NA	0.004 ± 0.0001	Tissue collected from harvested whales (2001)	Dehn et al. 2006
Zinc	16.0 ± 4.89	120 ± 34.4	Tissue collected from stranded whales (1999)	Mendez et al. 2002
	NA	279 ± 104	Tissue collected from stranded whales (1999)	Ruelas-Inzunza and Paez-Osuna 2002
	NA	39.47 ± 4.53	Tissue collected from harvested whales (2001)	Dehn et al. 2006

[1] Values represent the mean ± the standard error of the mean; dw = dry weight; µg/kg = micrograms per kilogram; mg/kg = milligrams per kilogram; NA = Not Available.
Source: see reference column.

3.16.3.3 Exposure to Food-Borne Pathogens

Millions of cases of food-borne illness occur each year in the United States, and causes include consumption of subsistence products (Himelbloom 1998; Fagan et al. 2011). Humans can be exposed to several types of pathogenic bacteria (e.g., *Clostridium botulinum*) during the harvesting, processing, preparation, and consumption of marine foods (e.g., fish, shellfish, or whale meat). There are reports of food-borne illness in Alaska Native subsistence communities where residents frequently consume whale meat and blubber (e.g., cases of botulism and salmonellosis in Alaska Natives consuming hunted or drift whales) (Bender et al. 1972; Shaffer et al. 1990; McLaughlin et al. 2004; Sobel et al. 2004; Fagan et al. 2011). Fagan et al. (2011) reported that the incidence of food-borne botulism in Alaska was greater than 800 times the overall U.S. rate and that nearly 14 percent of 141 food-borne botulism outbreaks in Alaska during 1947 to 2007 were associated with whale fluke, skin, or blubber. They also cited evidence that increasing botulism incidence among Alaska Natives during the 1970s and 1980s was associated with a change from traditional preservation of uncooked aquatic game foods in cool earthen pits to above-ground storage in synthetic containers. From 1990 to 2000, Sobel et al. (2004) reported on 58 botulism events that occurred in Alaska, with 103 persons affected. In 49 of these events, the contaminated food was identified as homemade Alaska Native foods consisting of fermented aquatic animal tissues, including whale skin or blubber (Sobel et al. 2004). The most common forms of food-borne pathogens identified when subsistence populations consume improperly cooked or handled food products (not just gray whale products) are characterized in Table 3-49. Like other subsistence cultures, the harvesting and consumption of ill-prepared or improperly stored gray whale products represent a potential pathway for exposure of the Makah Tribe to food-borne pathogens.

During butchering and subsequent handling, zoonotic infections can be passed from whale to human. Seal finger, or “Spekk finger,” is an infection passed through cuts and scratches from exposure to whale and seal tissues (Cawthorn 1997). Seal finger attacks the lymph system near the exposure site and nearest finger joints resulting in painful, thickened contracted joints (State of Alaska Epidemiology 1983). Other infections that have been reported from handling marine mammals include tuberculosis, leptospirosis, and brucellosis (Marine Mammal Commission et al. 2009).

The Makah Tribe hunted and harvested a gray whale in 1999. In the following account, Renker (2012) describes the processing of the whale caught in 1999. The account illustrates some potential health-related issues.

> . . . Some 1,400 Makahs welcomed the whale to Front Beach in Neah Bay, and paid honor to the great creature. Many Makahs ate raw blubber right on the spot, and then began the task of preparing the food and resources that the whale contributed to the Makah people.
>
> Butchering the whale proved a huge task for the Makah people. Lack of familiarity with gray whale anatomy, tools poorly adapted for gray whale meat and blubber, and logistical issues presented immediate obstacles for the butchering process which began on Front Beach. Some confusion also centered on whale parts other than meat and blubber. Most importantly, Makah were able to overcome these problems and continue with the job of processing the whale.

Table 3-49. Characteristics of food-borne pathogens[1].

Pathogen	Source	Preferred Environment	Symptoms
Clostridium botulinum	Soil and aquatic environments	Temperature range: 38 to 122 °F (3.3 to 50 °C) pH range 4.6 to 9.0 Salt tolerance: 5 to 10 percent Oxygen: Strict anaerobe[2]	Symptoms are double vision, paralysis, dizziness, difficulty swallowing, speaking, and breathing. Symptoms occur 12 to 72 hours after ingestion.
Enteropathogenic bacteria (Salmonella, Shigella, Escherichia coli, Yersinia, and Campylobacter)	Human and animal intestines, feces	Temperature range: 41 to 117 °F (5 to 47 °C) pH range: 4.5 to 9.0 Salt tolerance: 1 to 3 percent Oxygen: Facultative anaerobe[3]	Symptoms are diarrhea, abdominal pain, fever, nausea, dehydration, urinary tract infection, kidney failure. Symptoms occur 6 to 48 hours after ingestion.
Listeria monocytogenes	Humans, animals, vegetation	Temperature range: 36 to 111 °F (2.5 to 44 °C) pH range: 5.0 to 9.5 Salt tolerance: 10 to 30 percent Oxygen: Facultative anaerobe	Symptoms are flu-like, diarrhea, mild fever, stillbirth or spontaneous abortion. Symptoms occur 1 day to weeks after ingestion.
Staphylococcus aureus	Humans and animals	Temperature range: 50 to 113 °F (10 to 45 °C) pH range: 4.5 to 9.3 Salt tolerance: 10 to 20 percent Oxygen: Facultative anaerobe	Symptoms are vomiting, diarrhea, no fever. Symptoms occur 1 to 8 hours after ingestion.

[1] The food-borne pathogens in Table 3-49 are provided for general information and do not imply that gray whale products contain all of these pathogenic organisms.

[2] Strict anaerobes are bacteria that grow under anaerobic conditions (without oxygen), use anaerobic respiration, and are poisoned by oxygen.

[3] Facultative anaerobes are bacteria capable of growing under either aerobic (with oxygen) or anaerobic conditions.

Source: Himelbloom (1998).

> In a matter of hours, a flatbed truck had taken what was left of the whale and driven to the Makah Tribe’s fish plant, a processing plant with 800 cubic feet (22.7 cubic m) of freezer space and a service entrance large enough to allow the flatbed to drive inside. Within 24 hours, Front Beach showed no sign of the momentous event which had

> happened the previous day. The Makah butchering crew, which included Makahs who had traveled to Alaska to learn the processing techniques, had some assistance from an Alaska Native. Many people worked to butcher the parts of the whale which had not been distributed to Tribal members on the night of 17 May. In addition to meat and blubber, Makahs interviewed during the Makah Household Survey reported requesting and receiving whale lice, sinew, baleen, brain, and heart. Other Makahs reported that they would have liked to receive liver, cheeks, eyes, and intestines. Some of these items, like whale lice and baleen, are primarily used for ceremonial reasons, while others can be used in tool production or as food. The bulk of the food products derived from the whale were reserved for the Tribe's celebratory feast, which was to be held on 22 May.
>
> In private homes, people welcomed whale meat, blubber, and other whale parts. Between 17 May and 22 May, some households began to use recipes held in family confidence for decades, and others experimented with techniques used for other sea creatures, like seals and fish.

In summary, pathogenic organisms can and do occur in marine mammals and associated food products, including seals, walrus, dolphins, and whales. Illness has been reported in those who eat or handle these animals and food products, though they typically come from consuming either stranded or drift animals, or they result from improper preparation of traditional food products.

3.17 National and International Regulatory Environment

3.17.1 Introduction

The following sections describe national conditions related to the harvest of marine mammals, and international conditions related to the harvest of whales.

In the United States, take of marine mammals is prohibited, with certain exceptions and exemptions (1.2.3.2 Section 101(a) – Take Moratorium). Harvest of whales is prohibited by WCA regulations, except for aboriginal subsistence whaling authorized by paragraph 13 of the IWC Schedule (50 CFR 230.2) (Subsection 1.2.4.2, National Whaling Governance Under the WCA). This section reviews past waivers and requests for waiver of the MMPA take prohibition.

Internationally, harvest of whales is regulated by the ICRW (Subsection 1.2.4.1, International Whaling Governance under the ICRW), which established the IWC as the regulatory body governing whaling (Subsection 1.2.4.1.1, Functions and Operating Procedures of the IWC). While the IWC initially focused on regulating commercial harvest, from 1982 to 1986 the body phased in a moratorium on commercial whaling to be in effect pending adoption of a revised management scheme. Since that time, the parties to the ICRW have attempted to adopt a regulatory regime that would govern commercial harvest; these attempts have been unsuccessful and the moratorium remains in effect. The ICRW also governs aboriginal subsistence whaling but does not set limits on lethal research on whales. This section examines the whaling that has occurred worldwide since the IWC moratorium, the debates within the IWC over the different types of whaling, the United States' role in those debates, and the potential relationships between the positions and actions of the United States and whaling worldwide.

3.17.2 Regulatory Overview

3.17.2.1 Marine Mammal Protection Act

The MMPA take moratorium and the process for waiving the moratorium are described in detail in Subsection 1.2.3, Marine Mammal Protection Act. In addition to those provisions, section 109 of the Act pre-empts state authority governing marine mammals, but includes provisions for the Secretary to waive the take moratorium and return management authority to a state if certain conditions are met.

3.17.2.2 Whaling Convention Act

The WCA is described in detail in Subsection 1.2.4, Whaling Convention Act.

3.17.2.3 International Convention for the Regulation of Whaling

The ICRW is described in detail in Subsection 1.2.4.1, International Whaling Governance under the ICRW, in particular its provisions regarding commercial and aboriginal subsistence whaling. In addition, Article VIII of the ICRW authorizes parties to grant its nationals a special permit authorizing lethal scientific research, subject to conditions the contracting government thinks fit. Any killing or taking of whales under Article VIII is exempt from the operation of the convention. Article VIII also specifies requirements for reporting on and using (processing and distributing) whales after they are killed for scientific research. While contracting governments must submit scientific research permits to the IWC and its Scientific Committee for review, it is the contracting government that ultimately decides whether to issue a permit.

3.17.2.4 Pelly Amendment

Under the Pelly Amendment (22 USC 1978) to the Fishermen's Protective Act of 1954, when the Secretary of Commerce determines that the nationals of a foreign country are diminishing the effectiveness of an international fishery conservation program (including the IWC's program), the Secretary certifies this fact to the President. The President then has the discretion to ban imports of any products from the offending country "to the extent such prohibition is sanctioned by the World Trade Organization" (22 USC 1978) and/or direct Agencies to take non-trade related actions to encourage the certified nation to change its actions or the actions of its nationals. After making a certification, the Pelly Amendment requires the Secretary of Commerce to periodically review the activities of nationals of the offending country to determine if the reasons for which the certification was made no longer prevail. If so, the Secretary shall terminate the certification. If not, the certification remains active (22 U.S.C 1978 (d). A "Pelly Certification" has the potential to dissuade foreign governments from particular activities through a public announcement of their certification and the possibility of trade or non-trade sanctions. As of September 15, 2011, the Secretary had made 16 certifications under the Pelly Amendment for whaling activities, including the most recent in 2011 for Iceland's commercial whaling (Office of the U.S. Press Secretary 2011). The United States has not imposed trade sanctions as a result of Pelly Amendment certifications for whaling activities.

3.17.2.5 Packwood-Magnuson Amendment

In 1979, Congress passed the Packwood-Magnuson Amendment to the Magnuson Act of 1976. It requires the Secretary of Commerce to "periodically monitor the activities of foreign nationals that may affect [international fishery conservation programs];" (22 USC 1978(a)(3)(A)) "promptly investigate any activity by foreign nationals that, in the opinion of the Secretary, may be cause for certification," (22 USC1978(a)(3)(B)); and "promptly conclude; and reach a decision with respect to; [that] investigation" (22 USC 1978(a)(3)(C)). If the Secretary of Commerce certifies that "nationals of a foreign country, directly or indirectly, are conducting fishing operations or engaging in trade or taking which diminishes the effectiveness of the International Convention for the Regulation of Whaling" (16 U.S.C. 1821(e)(2)(A)(i)), the Secretary of State must reduce, by at least 50 percent, the offending nation's fishery allocation within the United States' fishery conservation zone (16 USC 1821(e)(2)(B)). Although the Amendment requires the imposition of sanctions when the Secretary of Commerce certifies a nation, it did not alter the initial certification process, except for requiring expedition. It also provided that a certification under the Packwood-Magnuson Amendment also serves as a certification for the purposes of the Pelly Amendment (16 USC 1821(e)(2)(A)(i).

The Packwood-Magnuson Amendment is no longer influential, because no foreign whaling nation currently fishes in United States waters (Buck 1998).

3.17.3 Existing Conditions

3.17.3.1 Waivers of the MMPA Take Moratorium

There have been few waivers of the MMPA take moratorium since passage of the MMPA (Bean 1997). This section examines past instances in which waiver of the MMPA take moratorium has been considered.

With passage of the MMPA and preemption of state management authority, the State of Alaska sought a return of management authority for 10 marine mammal species under section 109. In 1976, the Secretary of Interior returned management authority for walruses to Alaska (41 Fed. Reg. 14373, April 5, 1976). The Secretaries of Interior and Commerce conditionally approved Alaska's request for the other nine species in 1979 (44 Fed. Reg. 2540 and 2547, January 11, 1979). Alaska Natives challenged the state's ability to regulate their hunts for these species under the returned authority and prevailed in district court (*People of Togiak v. United States* 1979). In response to the court's decision, Alaska returned authority for walruses to the federal government and stated its intention not to pursue management authority over the remaining species (44 Fed. Reg. 45565, August 2, 1979). Congress reacted by revising section 109 to, among other things, allow financial assistance for states to develop management programs, as well as implement them. No state has sought management authority over marine mammals since Alaska's request.

In 1975, a fur importer, the Fouke Company, sought a waiver and permit to allow importation of baby fur seal skins from South Africa. NMFS granted the waiver in 1976 conditioned on harvest of the seals in South Africa not exceeding a certain level for the year. While Fouke's application for a permit was pending, it became known that the harvest level had been exceeded, so no permit was issued. Fouke applied for a permit to import skins from the following year's harvest, which NMFS granted. A federal circuit court ultimately invalidated the waiver and regulations because NMFS' decision did not meet MMPA requirements (the skins were from seals that were less than eight months old and nursing at the time of taking) (*Animal Welfare Institute v. Kreps* 1977).

In 1985, the Safari Club International petitioned the Secretary of Commerce to adopt a rule regarding waiver of the moratorium that would include, among other provisions, a requirement that NMFS review the status of marine mammals every 5 years, and whenever a waiver was proposed would make a final determination within 2 years of the proposal. In denying this petition, NMFS stated its belief that "administrative resources can best be utilized if waiver proceedings are initiated only when there is an indication that a waiver may be appropriate or when a specific proposal is under consideration" (51 Fed. Reg. 16085, April 30, 1986).

NMFS waived the moratorium and published regulations governing the take of Dall's porpoise in the Japanese fishery in the Bering Sea and North Pacific in 1987 (52 Fed. Reg. 19,874, May 28, 1987). NMFS did not waive the moratorium and publish regulations, however, for fur seals and other marine mammals that would be taken in the fishery, because of insufficient information. In invalidating NMFS' waiver and regulations, the court found that NMFS could not authorize a fishery it knew would take marine mammals not covered by the waiver and regulations (*Kokechik Fisherman's Association v. Secretary of Commerce* 1988).

3.17.3.2 Worldwide Whaling

The following discussion describes commercial, scientific, and aboriginal subsistence whaling worldwide within the IWC context, focusing in particular on the United States' position and role in the international debates. Tables 3-51 to 3-53 and Figures 3-18 to 3-20 depict the harvest in commercial, scientific, and aboriginal subsistence whaling conducted under IWC auspices since the commercial whaling moratorium became effective. Commercial whaling declined dramatically then ceased following the moratorium, grew steadily from 1991 through 1997, and has remained fairly level since that time. Scientific whaling increased steadily after 1985, peaked in 2005, and declined significantly in 2010. Aboriginal subsistence whaling has remained fairly steady, fluctuating around 350 whales harvested per year since the mid-1990s. The trend prior to 1998 is confounded by the fact that the hunt by the Chukotka Natives ceased altogether in 1992 and 1993 following the dissolution of the Soviet Union and state support for the hunt.

Table 3-50. Commercial whaling catches since 1985 (taken under Objection or Reservation to the Moratorium).

Year	Nation	Area	Fin	Sperm	Brydes	Minke	Total
1985/86	**USSR (pelagic)**	SH	0	0	0	3,028	3,028
	Japan (pelagic)	SH	0	0	0	1,941	1,941
	Total		0	0	0	4,969	4,969
1986 (1986/87)	**Norway (small type)**	NA	0	0	0	379	379
	Japan (coastal)	NP	0	200	2	311	513
	Japan (Bonin Islands)	NP	0	0	315	0	315
	USSR (pelagic)	SH	0	0	0	3,028	3,028
	Japan (pelagic)	SH	0	0	0	1,941	1,941
	Total		0	200	317	5659	6,176
1987 (1987/88)	**Norway (small type)**	NA	0	0	0	373	373
	Japan (coastal)	NP	0	188	11	304	503
	Japan (Bonin Islands)	NP	0	0	306	0	306
	Total		0	188	317	677	1,182
1993 (1993/94)	**Norway (small type)**	NA	0	0	0	157	157

Year	Nation	Area	Fin	Sperm	Brydes	Minke	Total
1994 (1994/95)	Norway (small type)	NA	0	0	0	206	206
1995 (1995/96)	Norway (small type)	NA	0	0	0	218	218
1996 (1996/97)	Norway (small type)	NA	0	0	0	388	388
1997 (1997/98)	Norway (small type)	NA	0	0	0	503	503
1998 (1998/99)	Norway (small type)	NA	0	0	0	625	625
1999 (1999/00)	Norway (small type)	NA	0	0	0	591	591
2000 (2000/01)	Norway (small type)	NA	0	0	0	487	487
2001 (2001/02)	Norway (small type)	NA	0	0	0	552	552
2002 (2002/03)	Norway (small type)	NA	0	0	0	634	634
2003 (2003/04)	Norway (small type)	NA	0	0	0	647	647
2004 (2004/05)	Norway (small type)	NA	0	0	0	544	544
2005 (2005/06)	Norway (small type)	NA	0	0	0	639	639
2006 (2006/07)	Norway (small type)	NA	0	0	0	545	545
	Iceland (small type)	NA	7	0	0	1	8
	Total		7	0	0	546	553
2007 (2007/08)	Norway (small type)	NA	0	0	0	597	597
	Iceland (small type)	NA	0	0	0	6	6
	Total		0	0	0	603	603
2008 (2008/09)	Norway (small type)	NA	0	0	0	536	536
	Iceland (small type)	NA	0	0	0	38	38
	Total		0	0	0	574	574
2009 (2009/10)	Norway (small type)	NA	0	0	0	484	484
	Iceland (small type)	NA	125	0	0	81	206
	Total		125	0	0	575	690
2010 (2010/11)	Norway (small type)	NA	0	0	0	468	468
	Iceland (small type)	NA	148	0	0	60	208
	Total		148	0	0	528	676
2011 (2011/12)	Norway (small type)	NA	0	0	0	533	533
	Iceland (small type)	NA	0	0	0	58	58
	Total		0	0	0	591	591
2012 (2012/13)	Norway (small type)	NA	0	0	0	464	464
	Iceland (small type)	NA	0	0	0	52	52
	Total		0	0	0	516	516
2013 (2013/14)	Norway (small type)	NA	0	0	0	594	594
	Iceland (small type)	NA	0	0	0	35	169
	Total		0	0	0	629	763
OVERALL TOTAL:							23,484

Source: IWC available at http://iwc.int/catches

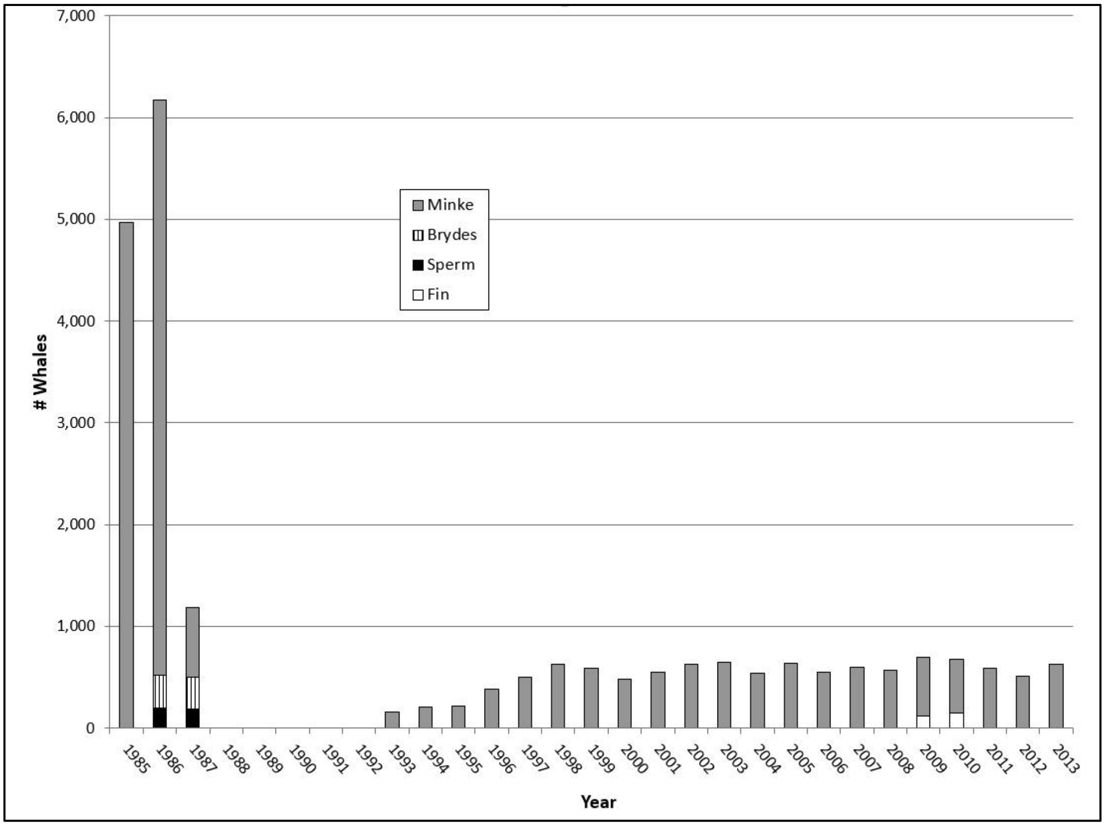


Figure 3-18. Commercial whaling catches by species since 1985.

1 Table 3-51. Scientific whaling catches since 1985 (Taken under Special Permit).

Year	Nation	Area	Fin	Sperm	Sei	Brydes	Minke	Total
1986 (86/87)	**Iceland**	NA	76	0	40	0	0	116
	Republic of Korea	NP	0	0	0	0	69	69
	Total		76	0	40	0	69	185
1987 (87/88)	**Iceland**	NA	80	0	20	0	0	100
	Japan (pelagic)	SH	0	0	0	0	273	273
	Total		80	0	20	0	273	373
1988 (88/89)	**Iceland**	NA	68	0	10	0	0	78
	Japan (pelagic)	SH	0	0	0	0	241	241
	Norway (small type)	NA	0	0	0	0	29	29
	Total		68	0	10	0	270	348
1989 (89/90)	**Iceland**	NA	68	0	0	0	0	68
	Japan (pelagic)	SH	0	0	0	0	330	330
	Norway (small type)	NA	0	0	0	0	17	17
	Total		68	0	0	0	347	415
1990 (90/91)	**Norway (small type)**	NA	0	0	0	0	5	5
	Japan (pelagic)	SH	0	0	0	0	327	327
	Total		0	0	0	0	332	332
1991 (91/92)	**Japan (pelagic)**	SH	0	0	0	0	288	288
	Total		0	0	0	0	288	288
1992 (92/93)	**Norway (small type)**	NA	0	0	0	0	95	95
	Japan (pelagic)	SH	0	0	0	0	330	330
	Total		0	0	0	0	425	425
1993 (93/94)	**Norway (small type)**	NA	0	0	0	0	69	69
	Japan (pelagic)	SH	0	0	0	0	330	330
	Total		0	0	0	0	399	399

Year	Nation	Area	Fin	Sperm	Sei	Brydes	Minke	Total
1994 (1994/95)	**Norway (small type)**	NA	0	0	0	0	74	74
	Japan	NP	0	0	0	0	21	21
	Japan (pelagic)	SH	0	0	0	0	330	330
	Total		0	0	0	0	425	425
1995 (1995/96)	**Japan**	NP	0	0	0	0	100	100
	Japan (pelagic)	SH	0	0	0	0	440	440
	Total		0	0	0	0	540	540
1996 (1996/97)	**Japan**	NP	0	0	0	0	77	77
	Japan (pelagic)	SH	0	0	0	0	440	440
	Total		0	0	0	0	517	517
1997 (1997/98)	**Japan**	NP	0	0	0	0	100	100
	Japan (pelagic)	SH	0	0	0	0	438	438
	Total		0	0	0	0	538	538
1998 (1998/99)	**Japan**	NP	0	0	0	1	100	101
	Japan (pelagic)	SH	0	0	0	0	389	389
	Total		0	0	0	1	489	490
1999 (1999/00)	**Japan**	NP	0	0	0	0	100	100
	Japan (pelagic)	SH	0	0	0	0	439	439
	Total		0	0	0	0	539	539
2000 (2000/01)	**Japan**	NP	0	5	0	43	40	88
	Japan(pelagic)	SH	0	0	0	0	444	444
	Total		0	5	0	43	484	532
2001 (2001/02)	**Japan**	NP	0	8	1	50	100	159
	Japan(pelagic)	SH	0	0	0	0	452	452
	Total		0	8	1	50	552	611
2002 (2002/03)	**Japan (pelagic)**	NP	0	5	40	50	102	197
	Japan (coastal)	NP	0	0	0	0	50	50

Year	Nation	Area	Fin	Sperm	Sei	Brydes	Minke	Total
	Japan (pelagic)	SH	0	0	0	0	441	441
	Total		0	5	40	50	593	688
2003 (2003/04)	**Iceland**	NA	0	0	0	0	37	37
	Japan (pelagic)	NP	0	10	50	50	101	211
	Japan (coastal)	NP	0	0	0	0	50	50
	Japan (pelagic)	SH	0	0	0	0	443	443
	Total		0	10	50	50	631	741
2004 (2004/05)	**Iceland**	NA	0	0	0	0	25	25
	Japan (pelagic)	NP	0	3	100	51	100	254
	Japan (coastal)	NP	0	0	0	0	60	60
	Japan (pelagic)	SH	0	0	0	0	441	441
	Total		0	3	100	51	626	780
2005 (2005/06)	**Iceland**	NA	0	0	0	0	39	39
	Japan (pelagic)	NP	0	5	100	50	101	256
	Japan (coastal)	NP	0	0	0	0	121	121
	Japan (pelagic)	SH	10	0	0	0	856	866
	Total		10	5	100	50	1,117	1,282
2006 (2006/07)	**Iceland**	NA	0	0	0	0	60	60
	Japan (pelagic)	NP	0	6	101	51	100	258
	Japan (coastal)	NP	0	0	0	0	97	97
	Japan (pelagic)	SH	3	0	0	0	508	511
	Total		3	6	101	51	765	926
2007 (2007/08)	**Iceland**	NA	0	0	100	0	39	39
	Japan (pelagic)	NP	0	3	100	50	100	253
	Japan (coastal)	NP	0	0	0	0	108	108
	Japan (pelagic)	SH	0	0	0	0	551	551
	Total		0	3	100	50	798	951

Year	Nation	Area	Fin	Sperm	Sei	Brydes	Minke	Total
2008 (2008/09)	**Japan (pelagic)**	NP	0	2	100	50	59	211
	Japan (coastal)	NP	0	0	0	0	122	122
	Japan (pelagic)	SH	1	0	0	0	680	681
	Total		1	2	100	50	851	1,004
2009 (2009/10)	**Japan (pelagic)**	NP	0	1	101	50	43	195
	Japan (coastal)	NP	0	0	0	0	122	122
	Japan (pelagic)	SH	1	0	0	0	507	508
	Total		1	1	101	50	672	825
2010 (2010/11)	**Japan (pelagic)**	NP	0	3	100	50	14	167
	Japan (coastal)	NP	0	0	0	0	105	105
	Japan (pelagic)	SH	2	0	0	0	171	173
	Total		2	3	100	50	290	445
2011 (2011/12)	**Japan (pelagic)**	NP	0	1	96	50	49	196
	Japan (coastal)	NP	0	0	0	0	77	77
	Japan (pelagic)	SH	1	0	0	0	266	267
	Total		1	1	96	50	392	540
2012 (2012/13)	**Japan (pelagic)**	NP	0	0	0	0	110	0
	Japan (coastal)	NP	0	3	100	34	74	0
	Japan (pelagic)	SH	0	0	0	0	103	0
	Total		0	3	100	34	287	424
2013 (2013/14)	**Japan (pelagic)**	NP	0	0	0	0	92	92
	Japan (coastal)	NP	0	1	100	28	3	132
	Japan (pelagic)	SH	0	0	0	0	252	252
	Total		0	1	100	28	347	476
OVERALL TOTALS:								16,039

Source: IWC available at http://iwc.int/catches

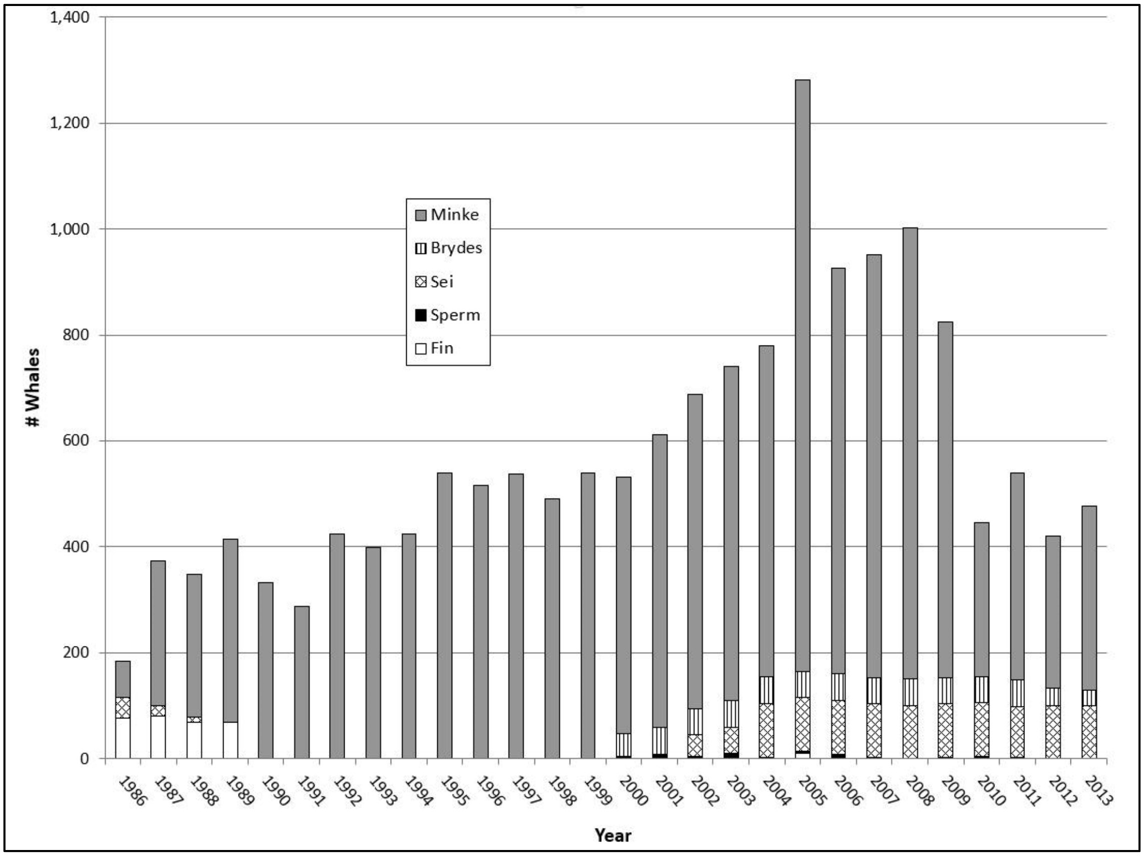


Figure 3-19. Scientific whaling catches by species since 1985.

1 Table 3-52. Aboriginal subsistence whaling catches since 1985.

Year	Nation	Fin	Humpback	Sei	Gray	Minke	Bowhead	Total
1985	**Denmark: W. Greenland**	9	8	0	0	222	0	239
	Denmark: E. Greenland	0	0	0	0	14	0	14
	USSR	0	0	0	169	0	0	169
	USA	0	0	0	1	0	17	18
	Total	9	8	0	170	236	17	440
1986	**Denmark: W. Greenland**	9	0	0	0	145	0	154
	Denmark: E. Greenland	0	0	0	0	2	0	2
	St. Vincent	0	2	0	0	0	0	2
	USSR	0	0	0	169	0	0	169
	USA	0	0	0	2	0	28	30
	Total	9	2	0	171	147	28	357
1987	**Denmark: W. Greenland**	9	0	0	0	86	0	95
	Denmark: E. Greenland	0	0	0	0	4	0	4
	St. Vincent	0	2	0	0	0	0	2
	USSR	0	0	0	158	0	0	158
	USA	0	0	0	0	0	31	31
	Total	9	2	0	158	90	31	290
1988	**Denmark: W. Greenland**	9	1	0	0	109	0	119
	Denmark: E. Greenland	0	0	0	0	10	0	10
	St. Vincent	0	1	0	0	0	0	1
	USSR	0	0	0	150	0	0	150
	USA	0	0	0	1	0	29	30
	Total	9	2	0	151	119	29	310

Year	Nation	Fin	Humpback	Sei	Gray	Minke	Bowhead	Total
1989	**Denmark: W. Greenland**	14	2	2	0	63	0	81
	Denmark: E. Greenland	0	0	0	0	10	0	10
	USSR	0	0	0	179	0	0	179
	USA	0	0	0	1	2	26	29
	Total	14	2	2	180	75	26	299
1990	**Denmark: W. Greenland**	19	1	0	0	89	0	109
	Denmark: E. Greenland	0	0	0	0	6	0	6
	USSR	0	0	0	162	0	0	162
	USA	0	0	0	0	0	44	44
	Total	19	1	0	162	95	44	321
1991	**Denmark: W. Greenland**	18	0	0	0	99	0	117
	Denmark: E. Greenland	0	1	0	0	7	0	8
	USSR	0	0	0	169	0	0	169
	Canada	0	0	0	0	0	1	1
	USA	0	0	0	0	0	46	46
	Total	18	1	0	169	106	47	341
1992	**Denmark: W. Greenland**	22	1	0	0	103	0	126
	Denmark: E. Greenland	0	0	0	0	11	0	11
	St. Vincent	0	2	0	0	0	0	2
	Russia	0	0	0	0	0	0	0
	USA	0	0	0	0	0	50	50
	Total	22	3	0	0	114	50	189

Year	Nation	Fin	Humpback	Sei	Gray	Minke	Bowhead	Total
1993	**Denmark: W. Greenland**	14	0	0	0	107	0	121
	Denmark: E. Greenland	0	0	0	0	9	0	9
	St. Vincent	0	2	0	0	0	0	2
	USA	0	0	0	0	0	52	52
	Total	14	2	0	0	116	52	184
1994	**Canada**	0	0	0	0	0	1	1
	Denmark: W. Greenland	22	1	0	0	104	0	127
	Denmark: E. Greenland	0	0	0	0	5	0	5
	Russia	0	0	0	44	0	0	44
	USA	0	0	0	0	0	46	46
	Total	22	1	0	44	109	47	223
1995	**Denmark: W. Greenland**	12	0	0	0	153	0	165
	Denmark: E. Greenland	0	0	0	0	9	0	9
	Russia	0	0	0	90	0	0	90
	USA	0	0	0	2	0	57	59
	Total	12	0	0	92	162	57	323
1996	**Canada**	0	0	0	0	0	1	1
	Denmark: W. Greenland	19	0	0	0	164	0	183
	Denmark: E. Greenland	0	0	0	0	12	0	12
	St. Vincent	0	1	0	0	0	0	1
	Russia	0	0	0	43	0	0	43
	Canada	0	0	0	0	0	1	1
	USA	0	0	0	0	0	44	44
	Total	19	1	0	43	176	46	285

Year	Nation	Fin	Humpback	Sei	Gray	Minke	Bowhead	Total
1997	**Denmark: W. Greenland**	13	0	0	0	148	0	161
	Denmark: E. Greenland	0	0	0	0	14	0	14
	Russia	0	0	0	79	0	0	79
	USA	0	0	0	0	0	66	66
	Total	13	0	0	79	162	66	320
1998	**Canada**	0	0	0	0	0	1	1
	Denmark: W. Greenland	11	0	0	0	166	0	177
	Denmark: E. Greenland	0	0	0	0	10	0	10
	St. Vincent	0	2	0	0	0	0	2
	Russia	0	0	0	125	0	1	126
	USA	0	0	0	0	0	54	54
	Total	11	2	0	125	176	56	370
1999	**Denmark: W. Greenland**	9	0	0	0	170	0	179
	Denmark: E. Greenland	0	0	0	0	15	0	15
	St. Vincent	0	2	0	0	0	0	2
	Russia	0	0	0	123	0	1	124
	USA	0	0	0	1	0	47	48
	Total	9	2	0	124	185	48	368
2000	**Canada**	0	0	0	0	0	1	1
	Denmark: W. Greenland	7	0	0	0	145	0	152
	Denmark: E. Greenland	0	0	0	0	10	0	10
	St. Vincent	0	2	0	0	0	0	2
	Russia	0	0	0	115	0	1	116
	USA	0	0	0	0	0	47	47
	Total	7	2	0	115	155	49	328

Year	Nation	Fin	Humpback	Sei	Gray	Minke	Bowhead	Total
2001	**Denmark: W. Greenland**	8	2	0	0	139	0	149
	Denmark: E. Greenland	0	0	0	0	17	0	17
	St. Vincent	0	2	0	0	0	0	2
	Russia	0	0	0	112	0	1	113
	USA	0	0	0	0	0	75	75
	Total	8	4	0	112	156	76	356
2002	**Canada**	0	0	0	0	0	1	1
	Denmark: W. Greenland	13	0	0	0	139	0	152
	Denmark: E. Greenland	0	0	0	0	10	0	10
	St. Vincent	0	2	0	0	0	0	2
	Russia	0	0	0	131	3	0	134
	USA	0	0	0	0	0	50	50
	Total	13	2	0	131	152	51	349
2003	**Denmark: W. Greenland**	9	1	0	0	185	0	195
	Denmark: E. Greenland	0	0	0	0	14	0	14
	St. Vincent	0	1	0	0	0	0	1
	Russia	0	0	0	128	0	3	131
	USA	0	0	0	0	0	48	48
	Total	9	2	0	128	199	51	389
2004	**Denmark: W. Greenland**	13	1	0	0	179	0	193
	Denmark: E. Greenland	0	0	0	0	11	0	11
	St. Vincent	0	0	0	0	0	0	0
	Russia	0	0	0	111	0	1	112
	USA	0	0	0	0	0	43	43
	Total	13	1	0	111	190	44	359

Year	Nation	Fin	Humpback	Sei	Gray	Minke	Bowhead	Total
2005	Denmark: W. Greenland	13	0	0	0	176	0	189
	Denmark: E. Greenland	0	0	0	0	4	0	4
	St. Vincent	0	1	0	0	0	0	1
	Russia	0	0	0	124	0	2	126
	USA	0	0	0	0	0	68	68
	Total	13	1	0	124	180	70	388
2006	Denmark: W. Greenland	10	1	1	0	181	0	193
	Denmark: E. Greenland	1	0	0	0	3	0	4
	St. Vincent	0	1	0	0	0	0	1
	Russia	0	0	0	134	0	3	137
	USA	0	0	0	0	0	39	39
	Total	11	2	1	134	184	42	374
2007	Denmark: W. Greenland	12	0	0	0	167	0	179
	Denmark: E. Greenland	0	0	0	0	2	0	2
	St. Vincent	0	1	0	0	0	0	1
	Russia	0	0	0	131	0	0	131
	USA: Alaska	0	0	0	0	0	63	63
	USA: Washington	0	0	0	1	0	0	1
	Total	12	1	0	132	169	63	377
2008	Denmark: W. Greenland	14	0	0	0	153	0	167
	Denmark: E. Greenland	0	0	0	0	1	0	1
	St. Vincent	0	2	0	0	0	0	2
	Russia	0	0	0	130	0	2	132
	USA	0	0	0	0	0	50	50
	Total	14	2	0	130	154	52	352

Year	Nation	Fin	Humpback	Sei	Gray	Minke	Bowhead	Total
2009	**Denmark: W. Greenland**	10	0	0	0	164	3	177
	Denmark: E. Greenland	0	0	0	0	4	0	4
	St. Vincent	0	1	0	0	0	0	1
	Russia	0	0	0	116	0	0	116
	USA	0	0	0	0	0	38	38
	Total	10	1	0	116	168	41	336
2010	**Denmark: W. Greenland**	6	9	0	0	187	3	205
	Denmark: E. Greenland	0	0	0	0	9	0	9
	St. Vincent	0	3	0	0	0	0	3
	Russia	0	0	0	118	0	2	120
	USA	0	0	0	0	0	71	71
	Total	5	12	0	118	195	76	406
2011	**Denmark: W. Greenland**	5	8	0	0	179	1	193
	Denmark: E. Greenland	0	0	0	0	10	0	10
	St. Vincent	0	2	0	0	0	0	2
	Russia	0	0	0	128	0	2	128
	USA	0	0	0	0	0	51	51
	Total	5	10	0	128	180	54	384
2012	**Denmark: W. Greenland**	5	10	0	0	148	0	163
	Denmark: E. Greenland	0	0	0	0	4	0	4
	St. Vincent	0	2	0	0	0	0	2
	Russia	0	0	0	143	0	0	143
	USA	0	0	0	0	0	69	69
	Total	0	12	0	152	143	69	381
2013	**Denmark: W. Greenland**	9	8	0	0	175	0	192
	Denmark: E. Greenland	0	0	0	0	6	0	6

Year	Nation	Fin	Humpback	Sei	Gray	Minke	Bowhead	Total
	St. Vincent	0	4	0	0	0	0	4
	Russia	0	0	0	127	0	1	128
	USA	0	0	0	0	0	57	57
	Total	9	12	0	127	181	58	387
OVERALL TOTALS								9,783

Source: IWC available at http://iwc.int/catches

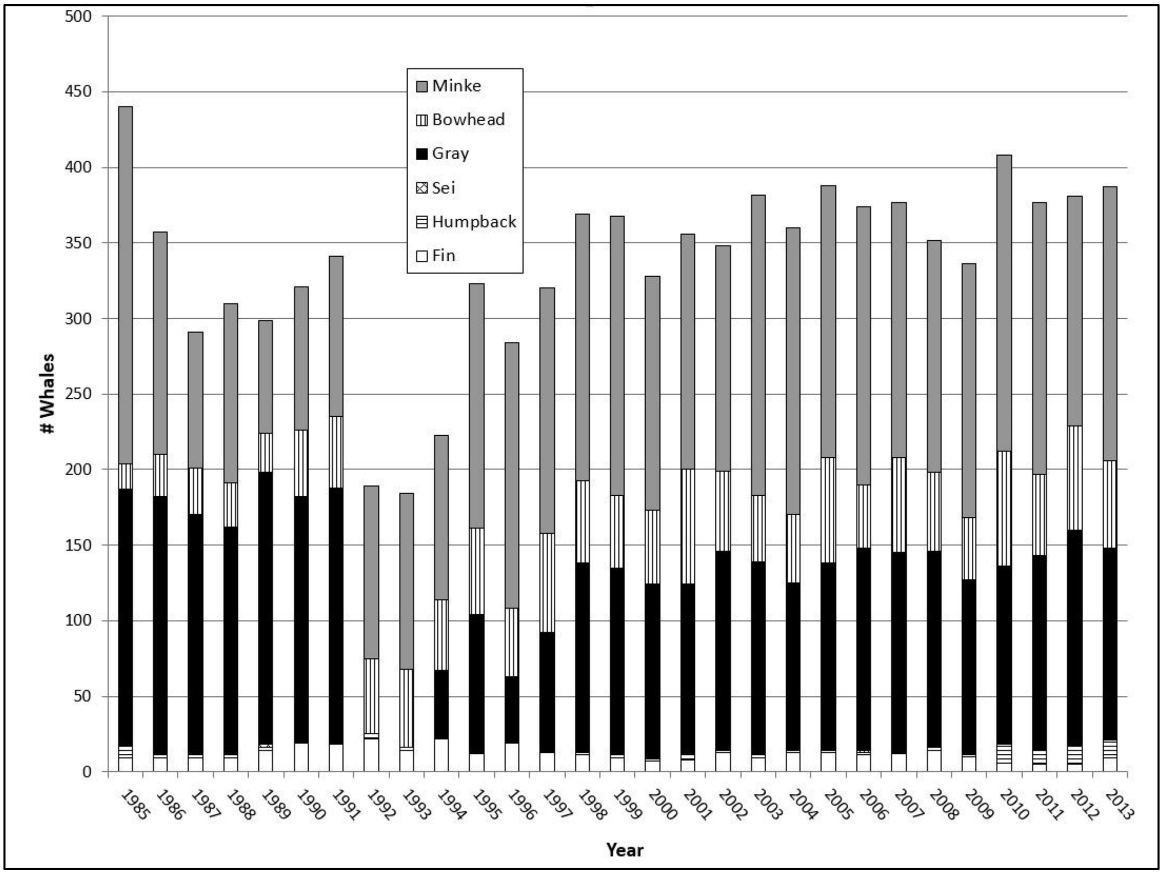


Figure 3-20. Aboriginal subsistence whaling catches by species reported to the IWC since 1985.

3.17.3.2.1 Commercial and Scientific Whaling

The United States was a leader in establishing the 1982 moratorium on commercial whaling (Stoett 1997). In 1949, the United States passed the WCA, banning all commercial whaling by United States nationals. Congress adopted resolutions requesting the Secretary of State to negotiate a 10-year moratorium on the commercial killing of whales in the international arena (16 USC 916 note, Public Law 96-60, August 15, 1979, 93 Stat. 403). In 1972, the first United Nations Conference on the Human Environment in Stockholm adopted a resolution calling for such a moratorium. The United States lobbied at each subsequent IWC annual meeting for incorporation of the moratorium into the IWC schedule, until its eventual adoption.

Prior to adoption of the moratorium, the Secretary of Commerce certified a number of countries under the Pelly Amendment finding their whaling activities diminished the effectiveness of the ICRW. In 1974, the Secretary of Commerce issued the first certifications under the Pelly Amendment directed at Japan and the Soviet Union for whaling in excess of IWC quotas. In 1978, the Secretary of Commerce certified Chile, Peru, and the Republic of Korea under the Pelly Amendment for their whaling practices.

In 1982, when the commercial whaling moratorium was adopted, Japan, Peru, Norway, and the Soviet Union all lodged objections. In response to Japan's objection to the moratorium and continued commercial whaling, the United States threatened to end Japanese access to fishing in United States waters under the Packwood-Magnuson Amendment. Japan withdrew its objection to the moratorium by 1988, and Peru withdrew its objection in 1983. The Soviet Union conducted pelagic commercial whaling of minke whales in the southern hemisphere through the 1985/1986 season. The Soviet Union never withdrew its objection, but stopped harvesting whales commercially after 1986. The Russian Federation, successor state to the Soviet Union, has not engaged in commercial whale harvest, but its objection to the moratorium remains.

When Norway objected to the moratorium and conducted small type coastal whaling in the 1986 and 1987 seasons, the Secretary of Commerce certified Norway under the Pelly Amendment; in 1987 Norway suspended its whaling. The Secretary of Commerce also certified Norway in 1990 and 1992 for its research whaling program. Norway then resumed commercial whaling in 1993 and was again certified by the Secretary of Commerce under the Pelly Amendment (Clinton 1993; Ek 1996). President Clinton did not impose trade sanctions, and explained in a letter to Congress that while "[t]he United States is deeply opposed to commercial whaling . . . [there is] an equally strong commitment to science-based international solutions to global conservation problems" (Clinton 1993). Clinton acknowledged that "not every country agrees with our position against commercial whaling," and initiated preparations for sanctions, but ultimately concluded that "the primary interest of the United States [is in] protecting the integrity of the IWC and its conservation regime," which could best be achieved through diplomatic measures (Clinton 1993). Norway remains certified under the Pelly Amendment. Norway is the only original objecting party that still conducts commercial whaling under objector status. The IWC has passed numerous resolutions asking the government to reconsider its objection and immediately halt all whaling under its jurisdiction (see for example, IWC Resolutions 1995-5, 1996-5, 1997-3, and 2001-5).

The Secretary of Commerce certified Japan's scientific whaling program in 1988, when Japan initiated its Antarctic program to conduct lethal studies of minke whales; in 1995, after Japan extended its minke whale program to the North Pacific; and in 2000 when Japan expanded its scientific whaling operations to include protected Bryde's and sperm whales. The Secretary stated that the United States government was "deeply concerned that the real aim of this large hunt is to pave the way for an outright resumption of commercial whaling (Mineta 2000)." Japan remains certified under the Pelly Amendment for its scientific whaling activities.

Iceland did not lodge an objection to the commercial whaling moratorium in 1982, but subsequently disagreed with maintenance of the ban and withdrew from the IWC in 1992. In 2002, Iceland was successful in obtaining re-admission to the IWC but lodged a reservation to the moratorium. The United States, along with 17 other countries, objected to Iceland's reservation to the moratorium when it was re-admitted to the IWC in 1992. The reservation language provides that Iceland will not authorize whaling for commercial purposes before 2006, after which it will not authorize whaling while progress is being made in negotiations on the management of commercial whaling. Iceland announced its intent on October 17, 2006 to resume commercial whaling for minke and fin whales (Black 2006; Fenner 2006). Icelandic commercial whalers killed 7 fin whales and 1 minke whale in 2006; 6 minke whales in 2007; 38 minke whales in 2008; 125 fin whales and 81 minke whales in 2009; and 58 minke whales in 2011 (Table 3-47). When Iceland resumed commercial whaling in 2006, the United States joined 24 other countries in lodging formal objections with the government of Iceland. The Secretary of Commerce also certified Iceland under the Pelly Amendment in 2004, and retained the certification in 2006. The Secretary again certified Iceland in 2011 for its harvest of endangered fin whales (Locke 2011). This certification remains in effect, though no trade sanctions have been imposed.

The continuing controversy over commercial whaling makes the future of whaling, and of the IWC, uncertain. The IWC in 1994 adopted the Revised Management Procedure, which is a method for determining a sustainable catch limit for some whale species. Nevertheless, the IWC did not lift the moratorium on commercial whaling because several parties, including the United States, argued that an inspection and control scheme was necessary to manage a hunt (Hogarth 2008). This scheme, together with the Revised Management Procedure, is known as the Revised Management Scheme. The consistent position of the United States has been that the moratorium should not be lifted at least until a revised management scheme is in place (Department of State 2003), and the United States has participated in good faith in negotiating such a scheme.

Discussions on the revised management scheme within the IWC have been at an impasse for several years. In 2006, a slight majority of IWC member nations adopted a resolution declaring the commercial whaling moratorium no longer necessary (IWC Resolution 2006-1, 'St Kitts and Nevis Declaration'). Yet at the 2007 IWC meeting in Anchorage, 37 countries adopted a resolution stating that the whaling ban "remains valid" (IWC 2007b). While slight majorities within the IWC have thus succeeded in adopting contradictory resolutions regarding the commercial whaling moratorium (resolutions are nonbinding), definitive action on the commercial moratorium or the revised management scheme is uncertain because neither the pro-commercial-whaling or anti-commercial-whaling sides of the debate have the three-fourths majority necessary for action (Henderson 2005; Hogarth 2006).

This paragraph summarizes the efforts from the 2007 annual meeting through the 2010 annual meeting to move forward on the revised management scheme, as reported in the Chair's Report from the 2010 meeting (IWC 2010c). At its 2007 annual meeting, the IWC agreed to hold a working meeting prior to its 2008 annual meeting to discuss the future of the IWC given the impasse over the revised management scheme. The group met in March 2008 and made sufficient progress that the IWC agreed at its 2008 meeting to establish a small working group to develop a package or packages for consideration by the IWC. At its 2010 annual meeting, the IWC considered the package developed by the small working group, which included a number of components. Those components included suspending the moratorium for 10 years on whaling occurring under special permit, objection, and reservation; bringing all whaling authorized by the parties under control of the IWC; limiting whaling to members currently whaling; ensuring no new non-indigenous whaling takes place on whale species not currently hunted; establishing caps for 10 years significantly lower than the current catches; introducing IWC monitoring, control, and surveillance for non-indigenous whaling; and creating a South Atlantic whale sanctuary. At the end of discussions on the proposal, the IWC chair concluded that consensus was not possible and provided personal guidance that the parties should proceed to work on important issues where there was no agreement, and to avoid discussion of contentious matters in IWC plenary sessions.

The IWC did not discuss the revised management scheme during its 2011 and 2012 annual meetings, and at the 2012 meeting the IWC decided to switch to biennial meetings (IWC 2012c).

3.17.3.2.2 Aboriginal Subsistence Whaling

Although aboriginal subsistence whaling was not controversial in the IWC through the mid-1970s, since that time several issues have arisen. One debate has focused on the sustainability of aboriginal subsistence harvests. Examples of harvests that have generated controversy include harvest of bowheads by Alaska Natives and harvest of minke, humpback, and fin whales by Native Greenlanders. Bowheads are listed as endangered under the ESA and listed in Appendix I of CITES (Subsection 1.4.1.2.1, Relevant Overview of Requests for Bowhead Whales on Behalf of Alaska Eskimos). In the early 1970s, the IWC Scientific Committee expressed concern about the status of the bowhead whale stock, and at the 1977 annual meeting of the IWC, recommended that the catch limit for aboriginal subsistence harvest of bowheads be set at zero (accepted by the IWC with a vote of 16-0, with the United States abstaining). In a subsequent special meeting in 1977, the United States and the Alaska Eskimo Whaling Commission presented a request to modify the ban and allow for a take of bowhead by Alaska Eskimos. Although the Scientific Committee rejected the proposal, the IWC plenary session allowed for a limited and strictly controlled hunt for 1978. Work on the bowhead aboriginal subsistence hunts continued in workshops and working groups following the special meeting. Some argued that the United States, by supporting an aboriginal hunt contrary to scientific advice regarding the conservation status of the stock, undermined the conservation arguments the United States and the IWC used to maintain the commercial moratorium (Hankins 1990). Continuous research since then has addressed questions regarding sustainability of a bowhead harvest.

Native Greenlanders harvest North Atlantic minke, humpback, and fin whales, which are classified as protected stocks under the IWC Schedule. For a number of years, the IWC Scientific Committee was unable to provide scientific advice to the IWC on safe catch limits because of lack of information regarding stock structure and minimum stock level, although this changed in 2007 with more solid data and advice on sustainable catch limits (IWC 2007b). The Scientific Committee continues to be able to provide advice on the sustainable catch of these stocks based on solid data.

Debate in the IWC over aboriginal subsistence whaling also centers on what groups of people qualify as aboriginal subsistence whalers, what manner of hunting qualifies as aboriginal subsistence hunting, and what use of the products of the hunt qualifies as subsistence use. Criticisms come from those who support commercial whaling and argue for equal consideration, and from animal rights groups opposed to all forms of whaling or concerned that aboriginal hunting methods result in inhumane killing. Criticisms have been leveled at the Greenlander, Bequian, Chukotkan, Alaska Native, and Makah hunts based on arguments that the hunters are not aborigines, that the manner of hunting is not aboriginal, or that the use of the products is not subsistence use.

Some critics have noted that the hunts of Greenlanders are particularly difficult to distinguish from commercial whaling because of the close integration of hunting and fishing activities and waged employment (Reeves 2002; Stevenson et al. 1997), plus the sale of 'mattak' and other surplus whale products on the Greenland market (Reeves 2002; Heide-Jørgensen 1994; Johansen 1997; High North Alliance 2007). At the 2012 meeting of the IWC there was considerable discussion regarding Greenland's needs statement (including topics related to harvest conversion factors, the availability of whale meat in restaurants, human health, and political practicalities), and the Commission did not adopt a proposed Schedule amendment for 6-year catch limits for the Greenland hunts (IWC 2012c).

The Bequian harvest is an offshoot of New England-based whale fisheries that operated in the West Indies in the mid-1700s (Reeves 2002). Meat from humpbacks is still considered highly palatable by the Afro-Caribbean population of St. Vincent and the Grenadines, and meat for local consumption seems to be the principal incentive for whaling, although products from the hunts (especially oil) are also sold on the wider regional market (Caldwell and Caldwell 1975; Australian National Task Force on Whaling 1997; Reeves 2002). The Bequian harvest of humpback whales was limited to a few whales by primarily one person for several years and was originally intended to be phased out. At the IWC annual meeting in 1996, however, St. Vincent and the Grenadines reported that a new whaler had taken up humpback whaling, causing concern on the part of some delegates (IWC 1997).

The Chukotkan hunt has raised concerns about the use of products from the hunt, because the blubber and some other gray whale components were being used as food in fox fur farms (IWC 1996; Australian National Task Force on Whaling 1997).

The 'subsistence use' definition formally adopted by the IWC includes the barter, trade, or sharing of whale products primarily within the local community, and allows for the sale of handicrafts made from whale products. Commercial whaling proponents argue that this creates a double standard and that sharing, bartering, and trading meat amounts to commerce (Stoett 1997). Alaska Eskimos are allowed to sell native articles of handicraft from bowhead whales within the borders of the United States under the provisions of the MMPA, and the restrictions were similar for the 1998 through 2000 Makah hunts, as well as the current proposed action. In the past, questions have been raised about whether the Makah harvest was a subsistence harvest because their original 1995 formal request to resume hunting of ENP gray whales stated that the Makah were reserving what they consider their treaty-secured right to whale for commercial purposes. They classified their ceremonial and subsistence request as ‘interim.’ The present request does not include such a statement.

The legitimacy of the Makah request has also been questioned because of the Tribe’s 70- to 80-year hiatus in whaling. (Subsection 1.1.4, Summary of Makah Tribe’s Historic Whaling Tradition, and Subsection 3.10.3.4.2, Factors Responsible for Discontinuation of the Hunt, describe the reasons for the hiatus.) The 1981 Ad Hoc Technical Working Group’s working definition of ‘aboriginal subsistence whaling’ refers to a “continuing traditional dependence” on whale products for subsistence (Section 3.17, Regulatory Overview; Subsection 1.4.1.2.1, Relevant Overview of Requests for Bowhead Whales on Behalf of Alaska Eskimos; Subsection 1.4.1.2.2, Overview of Requests for ENP Gray Whales on Behalf of the Makah). While other aboriginal subsistence whalers have had smaller breaks in subsistence tradition (e.g., the Chukotkans stopped whaling for a few years in the 1990s), no other group has had a break lasting for more than a generation.

Additional controversy was generated over the legitimacy of the Makah hunt as an aboriginal subsistence hunt when the IWC adopted Schedule language stating that products from the hunt “were to be used exclusively for local consumption by the aborigines whose traditional aboriginal subsistence and cultural needs have been recognized” (IWC 1997) (Subsection 1.4.1.2.2, Overview of Requests for ENP Gray Whales on Behalf of the Makah). Some observers asserted that “the more flexible the aboriginal subsistence whaling definitions become, the more susceptible the IWC will be to unyielding pressure by other communities with traditions of harvesting and using whales for commercial purposes” (Jenkins and Romanzo 1998). This issue became moot when the words “whose traditional aboriginal subsistence and cultural needs have been recognized” were deleted from Schedule 13 (Subsection 1.4.1.2.2, Overview of Requests for ENP Gray Whales on Behalf of the Makah).

Beginning in 1986, Japan argued that its coastal villages (generally referred to as small type coastal whaling) should be allowed to whale under the aboriginal subsistence whaling exception, also requesting that the sale of meat from the hunt be allowed on the open market. At the IWC meeting in 2002, Japan and other pro-whaling parties withheld support for the United States’ request for a bowhead quota for the years 2003 through 2007, but did not oppose the joint request of the Russian Federation and the United States for gray whales. Later that year at a special meeting, Japan and others approved catch limits for bowheads through 2007, and the United

States voted in favor of a resolution regarding Japan's plan for small type coastal whaling if it was non-commercial and based on scientific advice. That resolution did not pass.

At the 2007 IWC meeting in Anchorage, Japan continued to press for an allowance for small type coastal whaling. In a statement to the press, Japan's Commissioner argued that small type coastal whaling is no different from aboriginal subsistence whaling and accused IWC members of imposing a "double standard" (Hopfinger 2007). Prior to the meeting, the Japanese Commissioner stated that Japan would not oppose the Alaska Eskimo quota, while the United States Commissioner was quoted in the Anchorage papers saying the United States would strike no deals with Japan even if Japan opposed the bowhead quota (deMarban 2007). The United States' request for updated bowhead catch limits and the joint request of the Russian Federation and United States for gray whale catch limits were approved by consensus.

Japan has continued to reserve its right to propose an amendment to the schedule to allow small type coastal whaling (see, for example, IWC 2012c) but has not yet done so.

Outside the IWC forum or any international regulatory regime, aboriginal subsistence hunting occurred for hundreds to thousands of years. Refer to Subsection 3.4.3.6.1, Aboriginal Subsistence Whaling, for a list of tribes engaged in historic aboriginal hunts of ENP gray whales from California to Alaska and Chukotka. More recently, aboriginal subsistence hunts of whales is known to continue, or to have continued until recently, in three tropical areas: 1) humpback whale hunts in Equatorial Guinea, 2) sperm whale and other species in Indonesia, and 3) Bryde's whales in the Philippines. The humpback whale hunt off the island of Pagalu in the Gulf of Guinea is thought to have been introduced by American ship-based whalers in the 18th and 19th centuries (Reeves 2002). Natives target humpback calves, with an estimated catch level of 3 or fewer humpbacks per year (Aguilar 1985; Reeves 2002). Whale hunts for sperm whales and other whales off two Indonesian islands predates the arrival of American and English whalers by at least two centuries (Barnes 1991; Barnes 1996). Fishing, including whaling, is the principal source of sustenance, and whale products, including meat and oil, are sold at local markets (Barnes 1991; Barnes 1996; Reeves 2002). One group of natives has mainly targeted sperm whales in the large whale catch in recent years, totaling a catch of 664 whales from 1959 to 1995, while another group of natives seems to target mostly baleen whales, including fin, sei, and minke whales (Barnes 1996; Reeves 2002). Both groups also hunt small cetaceans. Bryde's whales were the main targeted species in the Philippines until the last documented catch in 1996, when a Philippine administrative order expanded the prohibition on killing dolphins to include all cetaceans (Reeves 2002). Whale hunting origins among fishermen ranged from 100 years to opportunistic hunting in the last few generations.

Although the United States has consistently supported sustainable aboriginal subsistence whaling, it objected to Canada's authorization of a bowhead hunt by Inuit hunters. In 1996, the Commerce Secretary certified Canada under the Pelly Amendment for allowing Inuit hunters to take two bowhead whales. The Secretary's certification stated that "[t]he United States supports aboriginal whaling when it is managed through the International Whaling Commission, the global body charged with responsibility for the international conservation and management of whale stocks and the regulation of whaling" (NOAA1996). Canada withdrew from the IWC in 1982.

Section 4

Environmental Consequences

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4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This section examines the potential direct and indirect effects of the six alternatives on each of the resources considered in this EIS. Direct effects are those that are caused by the action and occur at the same time and place, while indirect effects are those that are caused by the action but occur later in time or are farther removed in distance and are reasonably foreseeable. Both adverse and beneficial effects are considered.

Section 2 described the No-action Alternative and five action alternatives (we have not identified a preferred alternative in this draft EIS), and Section 3 described the current condition of the resources that may be affected by the alternatives. Section 5 will address any cumulative effects that might occur when the direct and indirect effects of any of the alternatives are considered in the context of past actions, other contemporaneous actions, or reasonably foreseeable future actions.

For each resource, Section 3 included a regulatory overview that provided information about how that resource is managed, which informs the criteria presented in this section for evaluating effects of the alternatives. This information was provided as background and it is not the purpose of this EIS to resolve legal issues. Rather, the focus of this EIS is to provide information to the decision-maker.

The five action alternatives examined (we have not identified a preferred alternative in this draft EIS) vary primarily in the timing and location of the hunt, the number of strikes, and the limits on mortality of PCFG whales. One alternative also varies in the hunting methods (use of all motorized vessels versus a wooden canoe, Alternative 3), and another varies in the duration of the waiver and regulations, as well as any permits granted under a waiver (Alternative 6). The principal components of timing, location, number of strikes, and PCFG mortality limits (described in Subsection 2.3.2.2, Gray Whale Hunt Details) are likely to influence the time of year the Tribe would hunt, the number of days the Tribe would hunt, and the number of whales the Tribe would likely kill and harvest. Also relevant to the analysis of effects is the number of times whales would be subjected to unsuccessful harpoon attempts, the number of times whales would be approached by Makah vessels, and the number of rifle shots or grenade explosions under each alternative. Table 4-1 contains the same information regarding the principal components of the alternatives as that contained in Table 2-1, Primary Differences Among Alternatives, and also includes additional annual estimates of 1) the likely timing of the hunt, 2) the likely number of hunting days, 3) the maximum number of ENP gray whales that might be killed, 4) the maximum and likely number of PCFG whales that might be killed, 5) the likelihood of killing a WNP whale, 6) the likely number of unsuccessful harpoon attempts, 7) the likely number of approaches, 8) the number of whales that might be successfully harvested, and 9) the likely number of rifle shots or grenade explosions. These estimates are relevant to evaluating the likely effects of the alternatives on most of the resources. The following discussion explains the basis for these estimates. It is impossible to predict any of these parameters with certainty, but including a reasonable estimate in the analysis helps make the analysis—and the comparison among alternatives—more concrete and specific.

Also, the following definitions for the various groups of whales analyzed in this section are provided below as a reminder for the reader (these terms are discussed in more detail in Subsection 3.4 Gray Whales, and are defined in the Glossary):

Western North Pacific (WNP) gray whales = Gray whales that feed during the summer and fall in the Okhotsk Sea (primarily off northeast Sakhalin Island, Russia), some of which also feed off southeastern Kamchatka in the Bering Sea.

Eastern North Pacific (ENP) gray whales = Gray whales that feed during the summer and fall primarily in the Chukchi, Beaufort, and northwestern Bering Seas, but also as far south as California.

Pacific Coast Feeding Group (PCFG) whales = Gray whales observed in at least 2 years between June 1 and November 30 in the PCFG area (along the U.S. and Canada coasts between 41°N and 52°N, excluding areas in Puget Sound) and entered into the Cascadia Research Collective's photo-identification catalog. For purposes of determining whether a harvested whale is a PCFG whale (i.e., counts against a bycatch or mortality limit), the Tribe's proposal under Alternative 2 would include cataloged whales seen in at least 1 year, while the other action alternatives would include cataloged whales seen in 2 or more years or at least once in the past 4 years.

Oregon to Southern Vancouver Island (OR-SVI) whales = PCFG whales observed in any survey area from southern Oregon to southern Vancouver Island (excluding areas in Puget Sound).

Makah U&A whales = PCFG whales observed in either the northern Washington survey area (from Cape Alava to Cape Flattery) or Strait of Juan de Fuca survey area (from Cape Flattery to Admiralty Inlet).[1]

[1] Identified boundaries are taken from Calambokidis et al. (2010); however, surveys and whale sightings can be opportunistic and not uniformly distributed within these boundaries.

Table 4-1. Primary differences among alternatives and associated assumptions for analysis.

Whale Hunting Components		Alt. 1 No Action	Alternative 2 Tribe's Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split Season Hunt	Alternative 6 Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits
Hunt timing		None	December 1 through May 31[a]	Same as Alternative 2	June 1 through November 30	December 1 through December 21; May 10 through May 31	Same as Alternatives 2 and 3
Hunt area		None	U&A west of Bonilla-Tatoosh line; no whale may be struck within 200 yards (182.9 m) of Tatoosh Island or White Rock during the month of May	Same as Alternative 2 except at least 5 miles (8 km) from shore	Same as Alternative 2 except no whale may be struck within 200 yards of Tatoosh Island or White Rock during any month	Same as Alternative 2	Same as Alternatives 2 and 5
Maximum limit for harvested, struck, and struck and lost whales	Annual	0	Up to 5 harvested, 7 struck, and 3 struck and lost	Up to 5 harvested, 6 struck, and 2 struck and lost	Up to 5 harvested, 7 struck, and 3 struck and lost; harvest, struck, and struck and lost limited by PCFG limit (see below)	Up to 5 harvested; struck and struck and lost limited by PCFG limit (see below)	Up to 4 harvested (7 over 2 years); up to 4 struck (7 over 2 years); struck and lost limited by strike limit or PCFG limit (see below)
	6-year	0	Up to 24 harvested, 42 struck, and 18 struck and lost	Up to 24 harvested, 36 struck, and 12 struck and lost	Up to 24 harvested, 42 struck, and 18 struck and lost; harvest, struck, and struck and lost limited by PCFG limit (see below)	Up to 24 harvested; struck and struck and lost limited by PCFG limit (see below)	Up to 21 harvested, 21 struck; struck and lost limited by PCFG limit (see below)

Additional limits on harvest or mortality of PCFG whales. Estimated limits are based on current conditions and could change based on updated information. The descriptions in the table are shorthand. Please refer to the narrative for full details, and Subsection 3.4.2.1.3, for background on the potential biological removal (PBR) approach.	N/A	Tribe's bycatch proposal (apply PBR-based formula, with Rmax of 4% and Recovery Factor same as for ENP (1.0) and Nmin of OR-SVI) (results in about 3.0 whales/year); struck but not landed do not count as PCFG; no carry-over of unused limit	Total mortality limit set at PBR (as reported in NMFS' stock assessment report or calculated by NMFS); additional female mortality limit set based on proportion of females in PCFG (results in about 2.7 males and 1.6 females); all struck but not landed count as PCFG whales in proportion to presence of PCFG whales; no carry-over of unused limit	Mortality limit set to achieve or maintain 80% of carrying capacity (PBR-based formula with same values as Alt 3 but a recovery factor of 0.35), minus other human-caused mortality (results in 1 whale); approach only known ENP males; all strikes count as PCFG; no carry-over of unused limit unless it's between 0.5 and 1.0	Mortality limit set at 10% of PBR as calculated in Alt 3 (results in about 1 whale/4 years); struck but not landed count as PCFG in proportion to presence of PCFG whales; carry-over of unused limit used to calculate hunt hiatus	Mortality limit set at PBR (as calculated in Alt 3) minus other human-caused mortality (results in about 2 whales/year); all struck but not landed count as PCFG in proportion to presence of PCFG whales; no carry-over of unused limit
Waiver and permit duration and additional regulations	N/A	Unlimited waiver period; up to 5-year permits; no additional regulations	Same as Alternative 2	Same as Alternatives 2 and 3	Same as Alternatives 2, 3, and 4	Waiver period ends after 10 years; 3-year permits
ESTIMATES FOR ANALYSIS						
Whale Hunting Components	**Alternative 1 No-action**	**Alternative 2 Tribe's Proposed Action**	**Alternative 3 Offshore Hunt**	**Alternative 4 Summer/Fall Hunt**	**Alternative 5 Split Season Hunt**	**Alternative 6 Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits**
Likely timing of hunt	NA	March-May	March-May	June 1-September 30	May 10 through May 31	Same as Alternatives 2 and 3
Likely number of hunting days per year	0	33	33 (with an additional 9 days possible during winter months)	7	11	Same as Alternative 2
Likely number of days with hunt-related trips (including scouting) per year	0	60	Same as Alternative 2	7	22	Same as Alternatives 2 and 3

Maximum number of ENP gray whales killed each year by Makah Tribe (based on current estimates of PCFG mortality limits)	0	7 based on strike limit	6 based on harvest limits and current estimates of PCFG mortality limits	1 based on current estimates of PCFG mortality limits	5 based on harvest limits and current estimates of PCFG mortality limits	7 over 2 years, no more than four in 1 year (based on strike limit)
Maximum number of PCFG whales that might be killed in a year (based on current estimates of PCFG mortality limits) and likely number killed per year	0	Maximum: 5 Likely: 2.8	Maximum: 3 Likely: 1.2	Maximum: 1 Likely: 1	Maximum: 1 Likely: 0.2 (1 every 5 years)	Maximum: 3.5 Likely: 1.4
If maximum number of strikes occur, likelihood of killing a WNP whale per year expressed as the median probability	0	0.012	0.010	0	0.009	0.006
Potential maximum number of unsuccessful harpoon attempts per year (based on estimated 6:1 ratio of unsuccessful harpoon attempts to successful strikes)	0	42	36	6	30	21
Potential maximum number of approaches per year[b] (based on estimated 8.3 approaches per day of hunting)	0	353	Same as Alternative 2	58	122[c]	Same as Alternatives 2 and 3
Likely number of whales successfully harvested on average per year (based on current population estimates and calculations, and other conditions specific to each alternative)	0	up to 4	Same as Alternative 2	0 – 1	0 – 1	up to 3.5
Likely number of rifle shots or grenade explosions per year (based on estimated 16 rifle shots and 3 grenade explosions per harvested whale)	0	Up to 64 rifle shots or 12 grenade explosions	Same as Alternative 2	0 – 16 rifle shots or 0 – 3 grenade explosions	0 – 16 rifle shots or 0 – 3 grenade explosions	Up to 56 rifle shots or 11 grenade explosions

a. With this and other alternatives, we rely on calendar year ("per year") calculations and estimates to simplify comparisons in this draft EIS.
b. The analysis also considers the likely number of approaches and attempted strikes per year for PCFG, OR-SVI, Makah U&A, and WNP gray whales. Those estimates are reported in Tables 4-4, 4-6, 4-8, 4-10, and 4-12.
c. Based on a maximum of 14.7 hunt days in May and December.

4.1.1 Alternative 1, No Action

Under Alternative 1, NMFS would not authorize a Makah gray whale hunt.

4.1.1.1 Potential Timing of a Hunt and Number of Hunting Days

Because no hunt would be authorized under Alternative 1, there would be no hunting season in the Makah U&A.

Because no hunt would be authorized under Alternative 1, there would be no hunting days in the Makah U&A.

4.1.1.2 Potential Number and Types of Vessels

Because no hunt would be authorized under Alternative 1, there would be no hunting vessels in the Makah U&A.

4.1.1.3 Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested

Because no hunt would be authorized under Alternative 1, there would be no whales killed as a result of hunting in the Makah Tribe's U&A. For the reasons described below, the entire ENP gray whale quota would likely be killed even though there would be no harvest by the Makah Tribe.

The current annual and 6-year catch limits set by the International Whaling Commission (IWC) for ENP gray whales are based on a joint request of the Russian Federation and the United States. The current catch limit set by the IWC is 744 whales over the 6-year period (2013 through 2018), with no more than 140 whales taken in any one year. A bilateral agreement between the Russian Federation and the United States, renewed each year, allocates those totals between the two countries. If we do not authorize a Makah gray whale hunt, or we authorize a hunt for fewer whales than provided in the 2013 bilateral agreement, the agreement provides that "either side may initiate discussions on the transfer of unused takes from one Native group to another." If a transfer is agreed to, the Russian Federation could authorize the Chukotka Natives to take any of the unused catch limit. There are several reasons to expect that such transfer would occur and that the Chukotka Natives would harvest any unused Makah allocation. First, the first joint request by Russia and the United States for a gray whale catch limit was for the same catch limit that had previously been adopted in response to the Russia-only request (in other words, the United States' allocation came out of the existing Russian allocation) (Subsection 1.4.1.2.2, Overview of Requests for ENP Gray Whales on Behalf of the Makah). The catch limit for gray whales, based on the needs of the Chukotka Natives alone, was 179 whales annually prior to 1991, 169 whales annually from 1992 through 1994, and 140 whales annually from1995 through 1997. Twice in the past, 2007 and 2012, the United States agreed to such a transfer (e.g., Ilyashenko and Hogarth

2007; Ilyashenko and DeMaster 2012), and for the period 2009 through 2012 the Chukotka Natives harvested nearly all of the IWC catch limit (an annual average of 123.5). For these reasons, it is reasonable to expect that if the Makah Tribe's request is denied, or authorized at a lower limit, or the Tribe is unable to use its entire allocation, any unused allocation would be transferred to and used by the Chukotka Natives.

Thus, although the alternatives considered in this EIS may result in the Makah Tribe harvesting different levels of ENP gray whales, the overall harvest of ENP gray whales is likely to be the same regardless of the alternative selected (that is, the total allowed under the IWC schedule). The difference would be *how and where* whales are killed, i.e., Makah using large caliber rifles in their U&A versus Chukotkans using smaller caliber rifles on their more northern hunting grounds. Where appropriate, the analysis notes the likely impact on a resource in the event the United States did not transfer any unused portion of the catch limit.

Beyond 2018, if we did not authorize a Makah gray whale hunt, it is reasonable to expect that the Russian Federation would request a renewal of the ENP gray whale catch limit of at least 744 whales over 6 years, consistent with their representations at the 2012 IWC meeting that their needs are greater than the total existing allocation (Borodin et al. 2012).

It is unlikely that any PCFG whales would be killed in a hunt under Alternative 1 because there would be no hunting in the Makah U&A and all aboriginal subsistence whaling would occur in Russian waters.

4.1.1.4 Potential Number of Unsuccessful Harpoon Attempts and Approaches

Because no hunt would be authorized under Alternative 1, no whales would be subjected to attempted strikes or approaches by hunters in the Makah U&A.

4.1.1.5 Potential Number of Shots Fired or Grenade Explosions

Because no hunt would be authorized under Alternative 1, there would be no shots fired or grenades exploded by hunters in the Makah U&A.

4.1.2 Alternative 2, Tribe's Proposed Action

Alternative 2 represents the Makah Tribe's proposal, with a minor modification to reflect the change in the IWC aboriginal subsistence whaling schedule from 5-year to 6-year catch limits (Subsection 1.4.1.2.2, Overview of Requests for ENP Gray Whales on Behalf of the Makah). Alternative 2 would authorize a hunt in the coastal portion of the Tribe's U&A (outside the Strait of Juan de Fuca) from December 1 through May 31. It would also prohibit striking whales within 200 yards (183 m) of Tatoosh Island and White Rock during May to minimize disturbance to feeding and nesting seabirds.

There would be a limit of 7 whales struck per year, 5 whales harvested per year, 24 whales harvested over 6 years, and 3 whales struck and lost per year. There would be a limit on the number of PCFG whales harvested, which would be calculated using a PBR-based formula (described in more detail below and displayed in Table 4-3). As noted in Subsection 3.4.3.4.1, PCFG Population Structure, under the Tribe's proposal any harvested whale that had been sighted in the PCFG seasonal range (even a whale only sighted once) would count against the PCFG limit. However, the Tribe does not propose to count struck and lost whales against the PCFG limit. Hunting methods would include the use of a wooden canoe, toggle-point harpoon, and .50 caliber rifle. An optional method of killing whales would be the use of a darting gun and penthrite grenade (though this option was not included in the Tribe's request). The regulatory framework under Alternative 2 would include no termination date for the authorization and regulations, and allow up to 5-year permits to be issued. These and additional details are described in Subsection 2.3.2.2, Gray Whale Hunt Details.

4.1.2.1 Potential Timing of a Hunt and Number of Hunting Days

Under Alternative 2, the hunting season would be December 1 through May 31. The environmental factors most likely to determine the timing of a hunt and the number of hunting days under Alternative 2 are: 1) ocean conditions favorable for scouting and locating whales, and 2) presence of whales. Social, economic, or other factors may further limit the number of days tribal members might hunt, but those factors are too speculative to include in an estimate.

The ocean conditions that are favorable for a hunt are wind speeds less than 16 knots (8.2 m/s) and wave height less than 6 feet (1.8 m). At wind speeds higher than 16 knots or waves higher than 6 feet, it becomes difficult to detect whales because their blows are quickly dispersed by the wind, it is difficult to observe them over the swells, and the boat operator must focus attention on navigation rather than scanning for whales (J. Scordino, pers. comm., Makah Tribe Marine Mammal Biologist, July 31, 2013) (refer to Subsection 3.4.3.5.7, Weather and Sea Conditions). On days with favorable ocean conditions, tribal hunters would likely only launch a hunt if at least one whale were present in the hunt area. We thus consider a "suitable hunting day" to be one with these favorable ocean conditions and whales present.

We examined data from a weather buoy stationed near the hunt area to determine the number of days by month with favorable ocean conditions. The Makah Tribe and the National Marine Mammal Laboratory provided data from their survey efforts in the hunt area to estimate the probability of whales being present per survey trip. We considered this a reasonable surrogate for the probability that tribal hunters would successfully locate whales. Table 4-2 shows the number of days with favorable ocean conditions and the probability that whales would be present on any day. The final column shows the product of these values, which is the number of suitable hunting days per month.

Table 4-2. Projected number of days during the hunting season with favorable ocean conditions and whales present.

Month	A. Number of Surveys with 1 or More Gray Whale Sightings	B. Number of Surveys with no Sightings of Gray Whales	C. Total Number of Ocean Surveys (A+B)	D. Probability of Sighting 1 or More Gray Whales (A/C)	E. 2004-2012 Average Number of Days with Favorable Ocean Conditions	Projected Suitable Hunting Days (DxE)
Jan	2	1	3	0.67	5.2	3.5
Feb	1	3	4	0.25	6.3	1.6
Mar	8	2	10	0.80	6.8	5.4
Apr	18	1	19	0.95	13.8	13.0
May	17	9	26	0.65	22.7	14.8
Jun	14	2	16	0.88	24.3	21.3
Jul	18	3	21	0.86	27.0	23.1
Aug	24	4	28	0.86	28.5	24.4
Sep	23	1	24	0.96	21.3	20.4
Oct	14		14	1.00	12.3	12.3
Nov	5	3	8	0.63	5.4	3.4
Dec	3	1	4	0.75	5.6	4.2

Under the Tribe’s proposed action, we expect the majority of hunting to occur in April and May because those are the months with the greatest number of suitable hunting days, with about 13 days in April and about 15 days in May. Tribal members may also try to maximize hunting opportunity by hunting during March, with about 5 suitable hunting days. In total, there could be 33.2 days of hunting per year during the spring under Alternative 2 (5.4 + 13.0 + 14.8 = 33.2). We consider it less likely that tribal members would hunt in December through February, when there are only a total of 9.3 suitable hunting days during the entire 3-month period (4.2 + 3.5 + 1.6 = 9.3). However, it is possible a hunt may occur during this time period, so we consider it in the analysis. If tribal members hunted on every suitable hunting day during December through May, that would equal about 42.5 days of hunting per year under Alternative 2 (33.2 + 9.3 = 42.5).

For a variety of reasons, this number may be an overestimate of the number of days tribal members would actually hunt. As noted, social and economic factors may result in tribal members not hunting on all suitable hunting days. Tribal members might also be able to harvest the average annual quota of four whales in fewer than the 42.5 suitable hunting days available each year. During 1999, the Tribe successfully hunted a single whale during 4 days of hunting. During the 2000 hunt, the Tribe hunted for 7 days without harvesting any whales. We conclude that this experience does not provide enough of an indication of how many days would be required for the Tribe to harvest a whale in the future, both because it is inconclusive (one data point of 4 days per whale harvested and another data point of 7 days and no whales), and because a hunt under current conditions may be different than the hunts during 1999 and 2000, primarily because of the knowledge of whales gained through the Tribe's extensive survey efforts in the intervening years. We therefore did not reduce the number of potential hunting days based on an estimate of average number of days per whale harvested.

In addition to the number of days in which tribal members would hunt from a canoe, under Alternative 2 there may be days in which a motorized vessel scouts for whales. We assume scouting may occur on every day with favorable ocean conditions. During March through May, there are a total of 43.3 days with favorable ocean conditions (6.8 + 13.8 + 22.7 = 43.3); thus, we assume there could be 43.3 days of scouting effort during the spring. If tribal members chose to hunt during December through February as well, there could be an additional 17.1 days with favorable ocean conditions (5.6 + 5.2 + 6.3 = 17.1), for a total of 60 possible days of hunt-related trips (including scouting effort) from December through May. This number may also be an overestimate of the number of days the Tribe would actually scout for whales, in part for the same reasons that our estimate of hunting days may be an overestimate, and in part because tribal members may scout whales opportunistically while engaged in other activities, rather than mount a dedicated scouting effort.

To summarize, we expect the maximum number of days of hunting and scouting under Alternative 2 to occur as follows:

- <u>Most likely: March through May</u>
  - 43.3 scouting days, 33.2 hunting days
- <u>Less likely: December through February</u>
  - 17.1 scouting days, 9.3 hunting days

4.1.2.2 Potential Number and Types of Vessels

Under Alternative 2, the Tribe would hunt from a wooden canoe (which would carry the harpooner and crew) and a motorized chase vessel (which would carry the rifleman, backup harpooner, and diver), with one of these vessels also carrying the whaling captain. It is likely that other vessels would be involved in the hunt, at least during the first few years of hunting. Similar to the 1999 hunt, such vessels could include a NOAA or Makah research vessel, a Coast Guard enforcement vessel, one or more vessels chartered by the media, and protest vessels (Subsection 1.4.2, Summary of Recent Makah Whaling — 1998 through 2013). It is difficult to predict the number of protest vessels, but it is likely there would be several that would accompany at least some hunt excursions, including small craft and jet skis, as was the case during the 1999 hunt. There also may be helicopters, similar to those chartered by the media during the 1999 hunt.

4.1.2.3 Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested

Potential Number of ENP Whales Killed

Under Alternative 2, the maximum number of whales that could be killed each year by the Tribe would be seven, because of the limit of seven strikes per year. This estimated maximum assumes that struck and lost whales subsequently die.

Maximum and Likely Number of PCFG, OR-SVI, and Makah U&A Whales Killed

Some of the whales killed might be PCFG whales; and of those, some might be OR-SVI and Makah U&A whales. Under Alternative 2, the Tribe proposes to stop hunting in any year if it harvests a calculated limit of PCFG whales. The Tribe proposes that this limit be calculated using NMFS' PBR methodology, based on the minimum abundance of whales in the OR-SVI, using a recovery factor of 1.0, and an Rmax of 4 percent.[2] Table 4-3 illustrates how the limit would be calculated. Under current conditions, the harvest limit would be 3.0 PCFG whales. Because the Tribe proposes to calculate and set the PCFG harvest limit each year, fractions of whales or unused whales would not be carried over to a subsequent year.

[2] Values for Rmax and the recovery factor are those submitted by the Makah Tribe to the IWC during the 2012 workshop focusing on the PCFG gray whale implementation review (IWC 2012e, Annex D). The 4 percent Rmax value used in that review was lower than the 4.7 percent used in the Tribe's 2005 waiver application to NMFS. We reviewed the differing values with the Tribe and determined that Alternative 2 (the Tribe's proposed action) should be interpreted as using an Rmax of 4 percent in keeping with the analysis and findings of the IWC Scientific Committee's 2012 review.

Table 4-3. Alternative 2 method of calculating PCFG harvest limits (Tribe's Proposed Action).

Element	Current Value	Source for Establishing Value in Future Calculations	Notes
One-half maximum net productivity rate (Rmax)	(½) 0.040 = 0.02	IWC 2012e (Annex D)	See Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates
Minimum population abundance of OR-SVI (Nmin)[a]	152	Reports based on annual PCFG surveys (currently Calambokidis et al. 2014)	See Subsection 3.4.3.4.3, PCFG Abundance and Trends
Recovery factor for ENP stock as a whole	1.0	IWC 2012e (Annex D)	See Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates
CURRENT RESULT	(0.02) * (152) * 1.0 = **3.0**		

[a] The value for Nmin is derived from photo-identification analyses of PCFG whales reported periodically by Cascadia Research Collective and NMFS (Calambokidis et al. 2014) and may change as new information becomes available.

The Tribe proposes to count against the harvest limit only whales that are successfully landed and identified, not those that are struck and lost. Some proportion of struck and lost whales might, however, be PCFG whales. With an average allowable harvest limit of three PCFG whales landed, and a restriction of three whales struck and lost per year, a maximum of five PCFG whales might be killed each year (of which all might be OR-SVI or Makah U&A whales). This would happen if two PCFG whales were struck and lost (and not counted against the harvest limit) before three PCFG whales were landed and identified.[3]

While five would be the *maximum* number of PCFG whales that might be killed each year under Alternative 2, it is unlikely that many would actually be killed given that there is a greater proportion of non-PCFG whales present in the Makah U&A during the spring portion of the hunting season when the Tribe is most likely to hunt. The proportion of PCFG whales in the Makah U&A during the December through February portion of the winter hunting season is unknown (Subsection 3.4.3.4.2, PCFG

[3] These maximum estimates are based on the unlikely assumption that all struck and lost whales are PCFG whales that subsequently die from such injury. It is possible that a harvested PCFG whale is falsely thought to be a non-PCFG whale because it is either mismatched or a match to the catalog is not found (J. Calambokidis, pers. comm., Cascadia Research Collective, May 14, 2014). Such cases (i.e., false negatives) are extremely rare and not included in our estimates.

Seasonal Distribution, Migration, and Movements). This analysis therefore also considers the *likely* number of PCFG whales that might be killed per year if the full number of strikes were to occur during the spring. The calculation is based on the proportional presence of PCFG whales in the coastal portion of the Makah U&A during March through May. In addition, the analysis considers the likely number of OR-SVI and Makah U&A whales that might be killed in a tribal hunt if the full number of strikes were to occur during the spring portion of the hunting season.

During the period 1996 to 2012, 40.33 percent of whale sightings (unique whale-days) during the March through May period in the northern Washington coast survey area were PCFG whales, 37.02 percent were OR-SVI whales, and 33.15 percent were Makah U&A whales (Subsection 3.4.3.4.3, PCFG Abundance and Trends). If seven whales were killed in a year under Alternative 2, the likely number of PCFG whales that would be killed would be 2.8 (7 whales killed times 40.33 percent), the likely number of OR-SVI whales killed would be 2.6 (seven whales killed times 37.02 percent), and the likely number of Makah U&A whales killed would be 2.3 (seven whales killed times 33.15 percent). These numbers are subsets of one another (the OR-SVI is contained in the PCFG area and the Makah U&A is contained in the OR-SVI area) [Figure 3-10] so are not additive). These estimates are also displayed in Table 4-4. If the Tribe also hunted in the winter, it is uncertain what the proportion of PCFG whales would be; thus, there could be more or fewer PCFG, OR-SVI, or Makah U&A whales killed.

Likelihood of Striking a WNP Whale

Finally, the analysis considers the likelihood that a WNP whale may be killed in a single year and over a 6-year period. There are very limited data for WNP whales in the project area to inform this analysis (Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements). Table 4-4 shows the calculated probability, displayed as the median estimate, of a WNP whale being struck based on seven strikes per year during the spring using estimates derived from modeling by Moore and Weller (2013), and strike/attempt/approach estimates specific to this alternative (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014).

Likely Number of ENP Whales Harvested

Under Alternative 2, the Tribe would be authorized to harvest on average four whales per year, with a maximum of five whales in a year. Therefore, the average annual number of whales that could be harvested is at most four whales.

4.1.2.4 Potential Number of Unsuccessful Harpoon Attempts and Approaches

In its waiver request, the Tribe referred to its experience in 1999 and 2000 to estimate there would be four unsuccessful harpoon attempts for each successful strike, and 20 whales approached for each successful strike. Based on our review of the available data from the 1999 and 2000 hunts, and in particular the reports of the 1999 (Gosho 1999) and 2000 (Gearin and Gosho 2000) hunts, we have developed different estimates for this analysis.

To estimate the potential number of unsuccessful harpoon attempts for the action alternatives, we considered the Tribe's hunt experience from both 1999 and 2000. In 1999, tribal hunters made three unsuccessful harpoon attempts and one successful strike. Based on this information, the Tribe's application concluded there would be four unsuccessful harpoon attempts for each successful strike. However, the actual ratio experienced in the 1999 hunt was 3:1, not 4:1, because the fourth attempt was successful. The Tribe also hunted in 2000 and made three unsuccessful harpoon attempts and no successful strikes. Thus, the ratio of unsuccessful harpoon attempts to successful strikes from the combined 1999 and 2000 hunting seasons would be 6:1. This is the ratio we use to estimate the number of unsuccessful harpoon attempts.

The Tribe's application does not explain the basis for the assumption that there would be 10 approaches for each whale struck. The Tribe estimated that with 10 approaches for each whale struck there would be 20 whales approached because of the average pod size of two whales, as observed during the southbound counts at Granite Canyon.

For the analysis in this EIS, we examined information from the 2000 hunt, because the report of that hunt (Gearin and Gosho 2000) documents the actual number of whales encountered by tribal hunters. During the 2000 hunt, tribal hunters approached 58 whales over 7 hunting days, for an average of 8.3 whales approached per day. We therefore use an average of 8.3 approaches per hunting day for the analysis in this EIS, because it is based on actual counts of whales approached and does not rely on assumptions about average pod size of south-migrating whales, which may not hold true for whales in the Makah U&A during the spring.

Under Alternative 2, with a maximum of seven possible strikes per year, there might be 42 unsuccessful harpoon attempts (seven strikes times six unsuccessful harpoon attempts). With up to 33.2 hunting days per year in the spring, the potential number of times that tribal hunters might approach a whale would be 276 (8.3 approaches per day times 33.2 days). If tribal members hunted during the winter as well, there could be an additional 77 approaches (8.3 per day times 9.3 days). Some of these attempted strikes and approaches could be repeated incidents involving the same whale. We also estimated the number of instances in which PCFG, OR-SVI, and Makah U&A whales could be subjected to unsuccessful harpoon attempts or approaches by hunters. For these estimates, we multiplied the number of strikes and approaches times the proportion of each subgroup of whales observed in the coastal portion of the Makah U&A during March through May (Subsection 3.4.3.4.3, PCFG Abundance and Trends). The estimates are displayed in Table 4-4.

Finally, we estimated the likelihood of an unsuccessful harpoon attempt or approach involving a WNP whale. For these estimates, we relied on modeling by Moore and Weller (2013), as described above (Subsection 4.1.2.3, Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested). The estimates are displayed in Table 4-4.

Table 4-4. Estimated number of strikes, unsuccessful harpoon attempts, and approaches of ENP, PCFG, OR-SVI, Makah U&A (MUA), and WNP whales under Alternative 2.

Whales		**Number of Strikes[a]**		**Number of Unsuccessful Harpoon Attempts[b]**		**Number of Approaches[c]**	
		Annual	**6-year**	**Annual**	**6-year**	**Annual**	**6-year**
ENP[d]		7	42	42	252	353	2,117
PCFG[e]	40.33%	2.8	17	17	102	142	854
OR-SVI[e]	37.02%	2.6	16	16	93	131	784
MUA[e]	33.15%	2.3	14	14	84	117	702
WNP[f]		0.012	0.070	0.070	0.352	0.455	0.974

a. Limited by regulation.
b. Calculated using number of unsuccessful harpoon attempts per successful strike (6:1), based on experience during 1999 and 2000 hunts combined.
c. Calculated using an estimate of 8.3 approaches per day of hunting and a total of 42.5 hunting days per year.
d. ENP estimates are maximum values.
e. Percentage estimates are based on the springtime whale analysis by Calambokidis et al. (2014) that compares whales seen in the spring to the entire catalog of whales identified in the PCFG range during the summer/fall feeding period (in contrast to the definition we use in this EIS for PCFG whales, which requires a whale to be have been seen in at least 2 years). This results in estimates that are likely higher and therefore more conservative than estimates that would be derived from a comparison with whales observed in at least 2 years. We conclude that this conservative approach is appropriate as it allows for the possibility that a whale sighted in the spring might later be seen for the second time in the PCFG seasonal range. Note that OR-SVI and MUA are nested regions within the PCFG range.
f. Median probability based on modeling by Moore and Weller (2013) using strike/attempt/approach estimates specific to this alternative (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014).

4.1.2.5 Potential Number of Shots Fired or Grenade Explosions

The Tribe proposes to use a .50 caliber rifle to kill whales that have been struck and secured with a harpoon. During the 1999 hunt, the Tribe's rifleman shot four times to kill the whale that was harvested. During the unauthorized gray whale hunt in 2007, at least 16 shots were fired (Subsection 1.4.2, Summary of Recent Makah Whaling — 1998 through 2013). Because the 2007 hunt followed none of the procedures recommended by the Tribe, and the hunters lost the .577 caliber rifle overboard, this number of shots may be higher than what would be experienced in a regulated hunt. Chukotka Natives kill gray whales using smaller caliber rifles than proposed by the Tribe, and have recently reported an average of 92 bullets per whale killed (Subsection 3.4.3.5.4, Method of Killing and Time to Death). For purposes of this analysis, we estimate that for each harvested whale there could be up to 16 shots fired, which is the number of shots fired during the unauthorized 2007 hunt. Under Alternative 2, the likely number of whales successfully harvested on average per year is four; thus, there could be up to 64 shots fired per year (16 shots times four whales harvested) and up to 384 shots over a 6-year period. We estimate that, if the Tribe used explosive projectiles to strike and kill whales, a maximum of three grenades per whale would be detonated based on the experience of other aboriginal whale hunters (Subsection 3.4.3.5.4, Method of Killing and Time to Death). This would result in up to 12 explosions per year if up to four whales are successfully harvested annually (or 72 explosions over a 6-year period).

It is also possible there could be shots fired or grenades exploded in conjunction with struck and lost whales, but we consider this unlikely because of the way "harvest" is defined. A whale is considered harvested once a flag or buoy has been attached (essentially, once a harpoon is successfully embedded). It is unlikely that hunters would fire rifles or grenades at a whale before it has been "made fast" with a harpoon attached to a buoy (refer to the Glossary and Subsection 1.1.1, Summary of the Proposed Action).

4.1.3 Alternative 3, Offshore Hunt

Alternative 3 would have the same conditions as Alternative 2 regarding the hunting season, limits on the numbers of ENP whales harvested, hunting methods, and regulatory framework. Alternative 3 would also have the same hunt area as Alternative 2, except that it would prohibit Makah hunters from making an initial strike on a gray whale within 5 miles (8 km) of shore (Makah hunters and chase boats may nevertheless have to follow any struck whale trailing harpoon lines to dispatch it, regardless of distance to shore). Alternative 3 would also differ from Alternative 2 in the way in which the PCFG limit would be calculated, including a provision for female PCFG whales, and the way in which struck and lost whales would be counted against the limit (described in more detail below and displayed in Table 4-5), resulting in a limit of two struck and lost whales, compared to three under Alternative 2. To allow full consideration of different hunt methods, Alternative 3 also assumes that the Tribe would most likely conduct a motorized hunt and not use canoes, in contrast with the other action alternatives that all include the use of a wooden canoe. These and additional details are described in more detail in Subsection 2.3.2.2, Gray Whale Hunt Details.

4.1.3.1 Potential Timing of a Hunt and Number of Hunting Days

Under Alternative 3, the hunting season would be the same as under Alternative 2 (December through May), with the same expected ocean conditions. Because of the requirement that hunts be conducted at least 5 miles (8 km) from shore, for purposes of analysis we assume that under Alternative 3 the Tribe would most likely conduct a motorized hunt and not use canoes. Although the Tribe would use motorized vessels under Alternative 3, the same two conditions would determine the likely timing of a hunt and the number of hunting days—favorable ocean conditions and presence of whales.

The difference in hunting vessel might, however, result in a slightly different manner of hunting under Alternative 3 compared to Alternative 2. Under Alternative 2, we estimate that scouting might occur on any day with favorable ocean conditions, but hunting would occur only on days in which scouts also located whales. In contrast, under Alternative 3, we expect that scouting and hunting trips would be combined, because hunters would use a motorized vessel and hunting would occur 5 miles (8 km) or more from shore. Therefore, considering the effort required to scout 5 miles (8 km) from shore, we assume that hunters would scout for whales on days with favorable ocean conditions and be prepared to harvest a whale if one were sighted. Thus, for Alternative 3, we assume that during March through May there would be 43.3 days of combined scouting and hunting (which is the total number of days with favorable ocean conditions during that period, as described in Subsection 4.1.2.1, Potential Timing of a Hunt and Number of Hunting Days), and that during December through February, there could be an additional 17.1 days of combined scouting and hunting (which is the total number of days with favorable ocean conditions during that period, as described in Subsection 4.1.2.1, Potential Timing of a Hunt and Number of Hunting Days). Together, these amount to 60 possible days of hunt-related trips (including scouting effort) from December through May.

To summarize, we expect days of combined scouting and hunting under Alternative 3 to occur as follows:

- <u>Most likely: March through May</u>
    - 43.3 days combined scouting and hunting days
- <u>Less likely: December through February</u>
    - 17.1 days combined scouting and hunting days

4.1.3.2 Potential Number and Types of Vessels

Under Alternative 3, the Tribe would most likely not hunt from a wooden canoe, as they proposed, but from a motorized vessel which would carry the whaling captain, harpooner, and crew. A second motorized vessel would serve as the chase vessel and would carry the rifleman, backup harpooner, and diver. It is likely that other vessels would be involved in the hunt, at least during the first few years of hunting. Similar to the 1999 hunt, such vessels could include the Makah or NOAA research vessel, a Coast Guard enforcement vessel, one or more vessels chartered by the media, and protest vessels (Subsection 1.4.2, Summary of Recent Makah Whaling — 1998 through 2013). It is difficult to predict the number of protest vessels, but it is likely there would be fewer small personal craft (e.g., jet skis) than during the 1999 hunt because of the distance from shore. There also may be helicopters, similar to those chartered by the media during the 1999 hunt.

4.1.3.3 Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested

Potential Number of ENP Whales Killed

Under Alternative 3, the Tribe would be allowed only two struck and lost whales (in contrast to Alternative 2, which would allow three struck and lost) as explained below in this subsection. Therefore, under Alternative 3, the maximum number of whales that could be killed in a year by the Tribe would be six. This maximum number would be reached in only two scenarios: 1) if the Tribe harvested four non-PCFG whales and struck and lost two whales (that subsequently died), or 2) if the Tribe harvested five non-PCFG whales and struck and lost one whale (that subsequently died). The latter scenario could occur, at most, in 4 out of 6 years but could not occur every year, otherwise the Tribe would exceed the 6-year harvest limit of 24 whales.

Maximum and Likely Number of PCFG, OR-SVI, and Makah U&A Whales Killed

Some of the whales killed might be PCFG whales, and of those some might be OR-SVI and Makah U&A whales. Under Alternative 3, there would be a limit on the *total mortality* of PCFG whales, in contrast with Alternative 2, which would impose a limit on the *harvest* of PCFG whales (that is, under Alternative 3, struck and lost whales would be counted against the PCFG limit, while under Alternative 2 they would not). Under Alternative 3, the annual mortality limit for PCFG whales would be equal to NMFS' calculation of PBR for the PCFG in its most recent stock assessment report (Subsection 3.4.2.1.4, Defining and Calculating PBR). This alternative would also have an annual mortality limit on female PCFG whales to account for the possible importance of mothers in recruiting offspring to the PCFG via matrilineal site fidelity (Subsection 3.4.3.4.1, PCFG Population Structure). The annual female PCFG mortality limit would be equal to the total PCFG mortality limit times the proportion of females in the PCFG, which is currently estimated to be 0.59 (Lang et al. 2011b). Table 4-5 illustrates how the total PCFG and female PCFG mortality limit would be calculated. The mortality limit using the current values for the PBR formula would be 2.68 PCFG whales of which only 1.6 (2.68 times 0.59) could be PCFG female whales. The hunt would stop before these limits were exceeded in any year. Because the mortality limit would be set each year, fractions of whales or unused whales would not be carried over to a subsequent year.

Table 4-5. Alternative 3 method of calculating PCFG mortality limits.

Element	Current Value	Source for Establishing Value in Future Calculations[a]	Notes
One-half maximum net productivity rate (Rmax)	(½) 0.062 = 0.031	NMFS' Stock assessment report (Carretta et al. 2014)	See Subsection 3.4.2.1.4, Defining and Calculating PBR
Minimum population abundance of PCFG (Nmin)	173	NMFS' Stock assessment report (Carretta et al. 2014)	See Subsection 3.4.3.4.3, PCFG Abundance and Trends
Recovery factor for PCFG	0.5	NMFS' stock assessment report (Carretta et al. 2014)	See Subsection 3.4.2.1.4, Defining and Calculating PBR
CURRENT RESULT	Total Mortality: (0.031) * (173) * 0.5 = **2.7** PCFG Female Mortality = 2.7 * 0.59 = **1.6**		

[a] Values for the elements used in this calculation are derived from NMFS Stock Assessment Reports, the most recent of which is Carretta et al. (2014). These values may change as new information becomes available. It is also possible that future reports could discontinue reporting values for PCFG whales. In that case, NMFS would base these calculations on an alternative source(s) for the best available scientific information regarding PCFG whales.

Alternative 3 would count whales that are struck and lost against the PCFG mortality limit in proportion to the availability of PCFG whales in the coastal portion of the Makah U&A from March through May (currently 40.33 percent, or 0.40 PCFG whales). It would also count a proportion of those whales as female PCFG whales based on the proportion of female whales in the PCFG during the feeding season (June through November). That proportion is currently 59 percent (Lang et al. 2011b), with the result being that a struck and lost whale would count as 0.24 PCFG females (0.40 times 0.59). In addition, under Alternative 3 the Tribe would be limited to a maximum of two struck and lost whales per year (in comparison to the limit of three struck and lost whales proposed by the Tribe and considered under Alternative 2). This limit would help to ensure that striking and losing two whales would, on average, limit impacts on PCFG females to approximately one per year (0.59 PCFG females times two strikes).

Given these considerations and current estimates, the maximum number of PCFG whales that could be killed in a year under Alternative 3 would be three whales, at least one of which must be a killed PCFG male and one a struck and lost whale that is assumed to subsequently die. Using the current estimates shown in Table 4-5, the following 11 scenarios involving PCFG whales are possible under this alternative.[4]

- 2 killed PCFG males = 2.0 PCFG whales (hunt stops because killing another PCFG whale would exceed the total mortality limit of 2.7 PCFG whales)
- 1 killed PCFG male followed by 1 killed PCFG female = 2.0 PCFG whales and 1.0 female PCFG whales (hunt stops because killing another PCFG whale would exceed the total mortality limit of 2.7 PCFG whales *and* killing another PCFG female would exceed the annual mortality limit of 1.6 PCFG females)
- 1 killed PCFG male followed by 1 struck and lost whale followed by 1 killed PCFG male = 2.40 PCFG whales and 0.24 female PCFG whales (hunt stops because killing another PCFG whale would exceed the total mortality limit of 2.7 PCFG whales)
- 1 killed PCFG male followed by 1 struck and lost whale followed by 1 killed PCFG female = 2.40 PCFG whales and 1.24 female PCFG whales (hunt stops because killing another PCFG whale would exceed the total mortality limit of 2.7 PCFG whales *and* killing another female PCFG whale would exceed the annual mortality limit of 1.6 PCFG females)
- 1 killed PCFG male followed by 2 struck and lost whales = 1.80 PCFG whales and 0.48 female PCFG whales (hunt stops because killing another PCFG whale would exceed the total mortality limit of 2.7 PCFG whales *and* the annual struck and lost limit is met)
- 1 killed PCFG female = 1.0 PCFG whales and 1.0 female PCFG whales (hunt stops because killing another PCFG female would exceed the annual mortality limit of 1.6 PCFG females)
- 1 struck and lost whale followed by 1 killed PCFG female = 1.40 PCFG whales and 1.24 female PCFG whales (hunt stops because killing another female PCFG whale would exceed the annual mortality limit of 1.6 PCFG females)
- 1 struck and lost whale followed by 2 killed PCFG males = 2.40 PCFG whales and 0.24 female PCFG whales (hunt stops because killing another PCFG whale would exceed the total mortality limit of 2.7 PCFG whales)

[4] Different values for the elements identified in Table 4-5 could change the maximum value and the possible scenarios.

- 1 struck and lost whale followed by 1 killed PCFG male followed by 1 struck and lost whale = 1.80 PCFG whales and 0.48 female PCFG whales (hunt stops because the annual struck and lost limit is met)
- 1 struck and lost whale followed by 1 killed PCFG male followed by 1 killed PCFG female = 2.40 PCFG whales and 1.24 female PCFG whales (hunt stops because killing another PCFG whale would exceed the total mortality limit of 2.7 PCFG whales *and* killing another female PCFG whale would exceed the annual mortality limit of 1.6 PCFG females)
- 2 struck and lost whales = 0.80 PCFG whales and 0.48 female PCFG whales (hunt stops because the annual struck and lost limit is met)

In these scenarios, any number of non-PCFG whales could be landed, up to the maximum of five in one year or an average of four per year over 6 years.

While three would be the *maximum* number of PCFG whales that might be killed each year under Alternative 3, it is unlikely that three would actually be killed given the proportion of PCFG whales present in the Makah U&A during the spring portion of the hunting season when the Tribe is most likely to hunt (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements). This analysis, therefore, also considers the *likely* number of PCFG whales that might be killed per year if the full number of strikes were to occur during the spring. The calculation is based on the proportional presence of PCFG whales in the coastal portion of the Makah U&A during March through May. In addition, the analysis considers the likely number of OR-SVI and Makah U&A whales that might be killed in a tribal hunt if the full number of strikes were to occur during the spring portion of the hunting season.

There are currently no data on the proportion of PCFG whales in the offshore hunt area under Alternative 3 because most surveys have been conducted closer than 5 miles (8 km) from shore (Subsections 3.4.3.3.2, ENP Seasonal Distribution, Migration, and Movements, Migratory Distribution Relative to Shore, and 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements). For this analysis, we assumed that PCFG whales would be present 5 miles (8 km) from shore in the same proportion they are present closer to shore. This may be a conservative assumption, as it is possible that migrating whales travel further from shore while PCFG whales travel closer to shore (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements).

During the period 1996 to 2012, 40.33 percent of whales identified from March through May in the northern Washington coast survey area were PCFG whales, 37.02 percent were OR-SVI whales, and 33.15 percent were Makah U&A whales (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements). Under Alternative 3, if a maximum of six whales were struck or killed in a year during the spring, the likely number of PCFG whales that would be struck or killed would be 2.4 whales (six whales times 40.33 percent), the likely number of OR-SVI whales struck or killed would be 2.2 (six whales times 37.02 percent), and the likely number of Makah U&A whales struck or killed would be 2.0 (six whales times 33.15 percent). These numbers are subsets of one another (the OR-SVI is contained in the PCFG area and the Makah U&A is contained in the OR-SVI area) (Figure 3-10) so are not additive. These estimates are also displayed in Table 4-6.

If the Tribe also hunted in the winter, it is uncertain what the proportion of PCFG whales would be; thus, there could be more or fewer PCFG, OR-SVI, or Makah U&A whales killed. However, because a proportion of all struck and lost whales would be counted against the PCFG limit, the maximum number of PCFG whales that could be killed per year would be three (as described above).

Likelihood of Striking a WNP Whale

Finally, the analysis considers the likelihood that a WNP whale may be killed in a single year and over a 6-year period. There are very limited data for WNP whales in the project area to inform this analysis (Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements). Table 4-6 shows the calculated probability of a WNP whale being struck based on six strikes per year during the spring, using estimates derived from modeling by Moore and Weller (2013) and strike/attempt/approach estimates specific to this alternative (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013 and June 12, 2014).

Likely Number of ENP Whales Harvested

As under Alternative 2, under Alternative 3 the Tribe would be authorized to harvest a maximum of five whales in a single year or 24 whales over a 6-year period (i.e., an average of four whales harvested per year).

4.1.3.4 Potential Number of Unsuccessful Harpoon Attempts and Approaches

Under Alternative 2, we estimated that for each whale struck there would be six unsuccessful harpoon attempts, and for each day of hunting there would be 8.3 whales approached. We use the same estimates as used for Alternative 3, although there would be differences between a hunt under Alternatives 2 and 3. Under Alternative 3, the Tribe would most likely use motorized vessels for hunting and would hunt more than 5 miles (8 km) from shore, in contrast to a hunt under Alternative 2, which would involve a wooden canoe and likely be conducted closer to shore, similar to the 1999 and 2000 hunts (Subsection 1.4.2, Summary of Recent Makah Whaling — 1998 through 2013). It may be easier for hunters to successfully approach and strike whales from a motorized vessel than from a canoe, so it is possible that there would be fewer incidents of whales being subjected to unsuccessful harpoon attempts and approaches than estimated for Alternative 2. On the other hand, there could be more approaches under Alternative 3 than Alternative 2 because of the relatively greater ease of getting close to whales in a motorized vessel. Absent specific information about an offshore motorized hunt, and given these considerations, we relied on the same information used under Alternative 2 to estimate the potential number of unsuccessful harpoon attempts and approaches.

Under Alternative 3, with a maximum of six possible strikes per year, there might be 36 unsuccessful harpoon attempts (i.e., using the 6:1 ratio of unsuccessful harpoon attempts to successful strikes from the combined 1999 and 2000 hunting seasons). Although hunting and scouting would be combined under Alternative 3, approaches of whales would only occur on days with whales present; thus, we use the same number of hunting days to estimate approaches as we used for Alternative 2. With up to 33.2 suitable hunting days per year in the spring (March through May), the potential number of times that tribal hunters might approach a whale would be 276 (8.3 per day times 33.2 days). If tribal members hunted during the winter as well, there could be an additional 77 approaches (8.3 per day times 9.3 days). Some of these unsuccessful harpoon attempts and approaches could be repeated incidents involving the same whale. We also estimated the number of instances in which PCFG, OR-SVI, and Makah U&A whales could be subjected to unsuccessful harpoon attempts or approaches by hunters. For these estimates, we multiplied the number of strikes and approaches times the proportion of each subgroup of whales observed in the coastal portion of the Makah U&A during March through May (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements). The estimates are displayed in Table 4-6.

Finally, we estimated the likelihood of an unsuccessful harpoon attempt or approach involving a WNP whale. For these estimates we relied on modeling by Moore and Weller (2013), as described above (Subsection 4.1.3.3, Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested). The estimates are displayed in Table 4-6.

Table 4-6. Estimated number of strikes, unsuccessful harpoon attempts, and approaches of ENP, PCFG, OR-SVI, Makah U&A (MUA), and WNP whales under Alternative 3.

Whales		Number of Strikes[a]		Number of Unsuccessful Harpoon Attempts[b]		Number of Approaches[c]	
		Annual	6-year	Annual	6-year	Annual	6-year
ENP[d]		6	36	36	216	353	2,117
PCFG[e]	40.33%	2.4	14.5	14.5	87.1	142	854
OR-SVI[e]	37.02%	2.2	13.3	13.3	80.0	131	784
MUA[e]	33.15%	2.0	11.9	11.9	71.6	117	702
WNP[f]		0.010	0.060	0.060	0.311	0.455	0.974

a. Limited by method of accounting for struck and lost whales as PCFG whales.
b. Calculated using number of unsuccessful harpoon attempts per successful strike (6:1), based on experience during 1999 and 2000 hunts combined.
c. Calculated using an estimate of 8.3 approaches per day of hunting, based on experience during the 2000 hunt, and a high estimate of 42.5 suitable hunting days.
d. ENP estimates are maximum values.
e. Percentage estimates are based on the springtime whale analysis by Calambokidis et al. (2014) which compares whales seen in the spring to the entire catalog of whales identified in the PCFG range during the summer/fall feeding period (in contrast to the definition we use in this EIS for PCFG whales, which requires a whale to have been seen in at least 2 years). This results in estimates that are likely higher and therefore more conservative than estimates that would be derived from a comparison with whales observed in at least 2 years. We conclude that this conservative approach is appropriate as it allows for the possibility that a whale sighted in the spring might later be seen for the second time in the PCFG seasonal range. Note that OR-SVI and MUA are nested regions within the PCFG range.
f. Median probability based on modeling by Moore and Weller (2013) using strike/attempt/approach estimates specific to this alternative (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013 and June 12, 2014).

4.1.3.5 Potential Number of Shots Fired or Grenade Explosions

For the reasons described under Alternative 2, we estimate there would be 16 rifle shots for each harvested whale. This would result in up to 64 rifle shots per year (16 shots times four whales harvested) and up to 384 shots over a 6-year period (64 shots annually times 6 years). Also as described under Alternative 2, we estimate there would be a maximum of 3 grenade explosions for each whale harvested. Thus, under Alternative 3, we would expect up to 12 explosions per year if up to four whales are successfully harvested annually (or 72 explosions over a 6-year period).

4.1.4 Alternative 4, Summer/Fall Hunt

Alternative 4 would have the same conditions as Alternative 2 regarding the hunt area (coastal portion of the Tribe's U&A), the hunting methods, and regulatory framework. In contrast to Alternative 2, Alternative 4 would have a different hunting season (June 1 through November 30 instead of December 1 through May 31) designed to completely avoid times when a WNP whale might be present. It would also prohibit striking whales within 200 yards (183 m) of Tatoosh Island and White Rock during any month to minimize disturbance to feeding and nesting seabirds, and would require that hunters approach only known males from the ENP stock (which includes PCFG males) to account for the possible importance of mothers in recruiting offspring to the PCFG via matrilineal site fidelity. Alternative 4 would also differ from Alternative 2 in the way in which the PCFG limit would be calculated and the way in which struck and lost whales would be counted against the limit (described in more detail below and displayed in Table 4-7). These and additional details are described in Subsection 2.3.4, Alternative 4 (Summer/Fall Hunt).

4.1.4.1 Potential Timing of a Hunt and Number of Hunting Days

Under Alternative 4, the hunting season would be June 1 through November 30—the opposite time of year from the hunting season in Alternatives 2 and 3 (December through May)—and hunting could occur any time during this period.

Under Alternative 2, where hunting would be more likely to occur during the spring, the factors most likely to influence the number of hunting days would be ocean conditions and the availability of whales. In contrast, under Alternative 4, there would be several months with many days of favorable ocean conditions (especially from June through September) (Table 4-2); thus, ocean conditions would not be a limiting factor. Under Alternative 4, the factor most likely to affect the number of hunting days would be the ability of the hunters to locate and strike a known male PCFG whale. As described in Subsection 3.4.3.4.2 (PCFG Seasonal Distribution, Migration, and Movements), the Makah Tribe's marine mammal biologist participates in a collaborative effort to survey gray whales by surveying the Makah U&A throughout the year, but primarily during the summer feeding season. The survey involves searching for, approaching, photographing, and/or taking biopsies of whales. The biopsy effort is a reasonable proxy for estimating the likely success of hunters in locating, approaching, and striking a known male (i.e., biopsied and cataloged as a male). According to the Tribe's analysis (J. Scordino, pers. comm., Makah Tribe Marine Mammal Biologist, July 31, 2013) a reasonable estimate of the maximum number of days it would take for tribal hunters to locate and strike a known male is 7 days. We have reviewed this analysis and concur that it is reasonable.

4.1.4.2 Potential Number and Types of Vessels

The hunt under Alternative 4 would involve the same number and types of vessels as the hunt under Alternative 2.

4.1.4.3 Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested

Potential Number of ENP Whales Killed

The potential number of ENP whales killed under Alternative 4 would be determined by the PCFG limit, which would be one under current conditions, and any whale struck would be counted as a PCFG whale (Subsection 2.3.4, Alternative 4 (Summer/Fall Hunt)). Table 4-7 illustrates how the PCFG limit would be calculated.[5] Because Alternative 4 (like Alternative 2) would allow up to seven strikes per year, the number of ENP whales potentially killed could be as high as seven, but this would require the PCFG abundance to more than triple, which is highly unlikely.

Table 4-7. Alternative 4 method of calculating PCFG mortality limits.

Element	Current Value	Source for Establishing Value in Future Calculations[a]	Notes
One-half maximum net productivity rate (Rmax)	(½) 0.062 = 0.031	NMFS' Stock assessment report (Carretta et al. 2014)	See Subsection 3.4.2.1.4, Defining and Calculating PBR
Minimum population abundance of PCFG (Nmin)	173	NMFS' Stock assessment report (Carretta et al. 2014)	See Subsection 3.4.3.4.3, PCFG Abundance and Trends
Recovery factor for PCFG	0.35	Wade (1998)	See Subsection 3.4.2.1.4, Defining and Calculating PBR
Other sources of human-caused mortality	0.45	NMFS' Stock assessment report (Carretta et al. 2014)	See Subsection 3.4.3.4.4 PCFG Status, Carrying Capacity (K), and Related Estimates
CURRENT RESULT	Total Mortality: (0.031) * (173) * 0.35 = 1.88 – 0.45 = **1.43 (rounded down to 1.0)**		

[a] Values for some of the elements used in this calculation are derived from NMFS Stock Assessment Reports, the most recent of which is Carretta et al. (2014). These values (e.g., for Rmax and Nmin) may change as new information becomes available. It is also possible that future reports could discontinue reporting values for PCFG whales. In that case, NMFS would base these calculations on an alternative source(s) for the best available scientific information regarding PCFG whales (such as the Wade (1998) citation here for a recovery factor).

Maximum and Likely Number of PCFG, OR-SVI, and Makah U&A Whales Killed

Under Alternative 4, there is a high likelihood that killed whales would be PCFG males because of the requirement to approach only known males and many of these cataloged males have been seen previously in the PCFG seasonal range. Because the hunt would occur in the Makah U&A, any PCFG

[5] For comparison, if other sources of human-caused mortality were to decline to half their present value (i.e., to 0.33 whales per year), the Tribe could harvest up to two whales in a given year, but only if the minimum population abundance of PCFG whales had increased to at least 215 whales, which is higher than the largest value of 204 whales reported by Calambokidis et al. (2014) in 17 years of recent estimates.

whale killed would also be an OR-SVI and Makah U&A whale. (If the PCFG abundance increased dramatically in the future, resulting in an increased PCFG mortality limit, any whales killed would likely be PCFG, OR-SVI, and Makah U&A whales for the same reasons.)

Also, unused portions of the PCFG mortality limit would not carry over to a subsequent year, except that when the mortality limit is less than 1 but greater than 0.5 during 2 consecutive years, it would be aggregated to allow for the mortality of one PCFG whale during the second year. The purpose of not allowing mortality limits to carry over is to prevent mortality of multiple PCFG whales in a single year (unless the calculated mortality limit allowed for more than one whale to be killed[6]). The purpose of allowing a carry-over when the mortality limit is greater than 0.5 but less than 1 is to afford the Tribe an opportunity to hunt at least every other year but with a harvest limit that is sensitive to declines in PCFG abundance or if PCFG whales are killed in unexpected numbers by other sources of human-caused mortality (the current level of human-caused mortality averages about 0.45 whales per year) (Carretta et al. 2014).

No hunting would be permitted when the PCFG mortality limit for a single year is less than 0.5 nor would the mortality limit carry over. The purpose of this provision is to prohibit a hunt if the PCFG experiences a significant decline (i.e., to roughly half its current abundance) or if PCFG whales are killed in unexpected numbers by other sources of human-caused mortality.

Likelihood of Striking a WNP Whale

The hunting season under Alternative 4 is designed to avoid the potential for striking a WNP whale. It is extremely unlikely that a WNP whale would be struck under Alternative 4 because such whales, by definition, would be feeding in the WNP during the summer feeding period.

Likely Number of ENP Whales Harvested

The maximum number of whales the Tribe could harvest in any year under current conditions would be one, because of the PCFG limit. It is possible that in some years the Tribe would harvest no whales, either because of the difficulty of locating and striking only known males, or because of the fact that under Alternative 4 a struck and lost whale would count against the PCFG limit, thus ending the hunt for that year. We therefore consider the *likely* harvest under Alternative 4 to be between zero and one whale.

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[6] For example, the mortality limit could reach two whales in a single year if the PCFG minimum population estimate increased to 240 whales and all other calculation values in Table 4-7 remained constant.

4.1.4.4 Potential Number of Unsuccessful Harpoon Attempts and Approaches

Under Alternative 2, we estimated that for each whale struck there would be six unsuccessful harpoon attempts, and for each day of hunting there would be 8.3 whales approached. It is possible that the ratio of unsuccessful harpoon attempts to successful strikes could be lower under Alternative 4 because whales approached during the summer feeding period may be more likely to be milling and less likely to be traveling than whales found during the spring, making them more vulnerable to a successful strike. Nevertheless, for purposes of this analysis, we use the observed ratio of 6:1 for Alternative 4, as that represents the best information available based on actual experience from the 1999 and 2000 hunts. With only one strike under Alternative 4, we would therefore expect six unsuccessful harpoon attempts.

Under Alternative 4, with a maximum of one strike per year under current conditions, there might be six unsuccessful harpoon attempts (one strike times six unsuccessful harpoon attempts). With a likelihood of 7 hunting days per year, the potential number of times that tribal hunters might approach a whale would be 58 (8.3 times per day times 7 days). Some of these unsuccessful harpoon attempts and approaches might be repeated incidents involving the same whale. We also estimated the number of instances in which PCFG, OR-SVI, and Makah U&A whales might be subjected to unsuccessful harpoon attempts or approaches by hunters. For these estimates we assumed that any whale subjected to unsuccessful harpoon attempts or approaches by hunters in the coastal portion of the Makah U&A between June 1 and November 30 would be a PCFG whale and, therefore, would also be an OR-SVI and Makah U&A whale. The estimates are displayed in Table 4-8.

Finally, we estimated the likelihood of an unsuccessful harpoon attempt or approach involving a WNP whale. For these estimates we relied on Moore and Weller (2013), as described above (Subsection 4.1.4.3, Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested). The estimates are displayed in Table 4-8.

Table 4-8. Estimated number of strikes, unsuccessful harpoon attempts, and approaches of ENP, PCFG. OR-SVI, Makah U&A (MUA), and WNP whales under Alternative 4.

Whales		Number of Strikes[a]		Number of Unsuccessful Harpoon Attempts[b]		Number of Approaches[c]	
		Annual	6-year	Annual	6-year	Annual	6-year
ENP		1	6	6	36	58	349
PCFG[d]	100%	1	6	6	36	58	349
OR-SVI[d]	100%	1	6	6	36	58	349
MUA[d]	100%	1	6	6	36	58	349
WNP[e]	0%	0	0	0	0	0	0

a. Limited by mortality limit for PCFG whales and method of accounting for struck and lost whales.

b. Calculated using number of unsuccessful harpoon attempts per successful strike (6:1), based on experience during the 1999 and 2000 hunts combined.
c. Calculated using an estimate of 8.3 approaches per day of hunting, based on experience during the 2000 hunt, and a high estimate of 7 hunting days.
d. 100 percent estimates based on requirement to approach only known ENP males, the high likelihood that these would be PCFG whales, and the conservative assumption that any known PCFG male in the Makah U&A during the hunting season is presumed to be a Makah U&A whale. Note that OR-SVI and MUA are nested regions within the PCFG range.
e. Values assumed to be zero because there are no records of WNP whales in the Makah U&A during the June through November timeframe associated with this alternative.

4.1.4.5 Potential Number of Shots Fired or Grenade Explosions

For the reasons described under Alternative 2, we estimate there would be 16 shots fired for each whale harvested. Thus, under Alternative 4, we would expect up to 16 shots fired per year (16 shots times one whale harvested) and up to 96 shots over a 6-year period. Also as described under Alternative 2, we estimate there would be three grenade explosions for each whale harvested. Thus, under Alternative 4 we would expect up to three grenade explosions per year and up to 18 explosions over a 6-year period.

4.1.5 Alternative 5, Split-season Hunt

Alternative 5 would have the same conditions as Alternative 2 regarding the hunt area (coastal portion of the Tribe’s U&A), hunting methods, and regulatory conditions. In contrast to Alternative 2, Alternative 5 would have a different “split-season” hunting period (December 1 through December 21 and May 10 through May 31, instead of December 1 through May 31). Alternative 5 would also differ from Alternative 2 in the way in which the PCFG limit would be calculated and the way in which struck and lost whales would be counted against the limit (described in more detail below and displayed in Table 4-9). These and additional details are described in Subsection 2.3.5, Alternative 5 (Split-Season Hunt).

4.1.5.1 Potential Timing of a Hunt and Number of Hunting Days

Under Alternative 5, the hunting season would be 3 weeks in December and 3 weeks in May, in contrast to Alternative 2 which has a 6-month-long hunting season. As described under Alternative 2, factors most likely to affect the timing of a hunt and number of hunting days would be ocean conditions and presence of whales (Subsection 4.1.2.1, Potential Timing of a Hunt and Number of Hunting Days).

The hunting season under Alternative 5 is from December 1 through 21, and May 10 through 31. Similar to Alternative 2, we expect that tribal members under Alternative 5 would only hunt in favorable ocean conditions when whales have been detected in the hunt area. In contrast to Alternative 2, we focused our review of data for wind speed and wave height in the hunt area for just the periods of December 1 through 21 and May 10 through 31 and concluded that the proportion of days with favorable ocean conditions was 22.5 percent for December and 78.0 percent for May (NOAA National Data Buoy Center 2013). Using those proportions (instead of the monthly values in Table 4-2 used for

Alternative 2) yields 4.7 days of favorable ocean conditions in December (21 days times 0.225 = 4.7) and 17.2 days of favorable ocean conditions in May (22 days times 0.780 = 17.2).

As under Alternative 2, we expect that hunting under Alternative 5 would only occur on days with favorable ocean conditions and whales present in the hunt area. Applying the proportion of days that whales are present from Table 4-2 yields 3.5 days of favorable ocean conditions and whales present for December 1 through 21 (4.7 days times 0.75 = 3.5) and 11.2 days of favorable ocean conditions and whales present for May 10 through 31 (17.2 days times 0.65 = 11.2) for a total of 14.7 hunting days per year. Also, as with Alternative 2, we expect hunting would be most likely to occur in the spring (May), but because it is possible that tribal members might hunt in December, we also consider the potential impacts of a winter hunt.

Under Alternative 5 there may also be days in which tribal members scout for whales using a motorized vessel. As with Alternative 2, we assume scouting may occur on every day with favorable ocean conditions. During May 10 through 31, as described above, there are a total of 17.2 days with favorable ocean conditions; thus, we assume there could be 17.2 days of scouting effort during May, which is the most likely time for hunting to occur. If tribal members chose to hunt during December as well, there could be an additional 4.7 days with favorable ocean conditions, for a total of 22 possible days of hunt-related trips (including scouting effort) under Alternative 5.

To summarize, we expect days of hunting and scouting[7] to occur under Alternative 5 as follows:

- Most likely: May 10 through 31
    - 17.2 scouting days, 11.2 hunting days
- Less likely: December 1 through 21
    - 4.7 scouting days, 3.5 hunting days

4.1.5.2 Potential Number and Type of Vessels

The hunt under Alternative 5 would involve the same number and types of vessels as the hunt under Alternative 2.

4.1.5.3 Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested

Potential Number of ENP Whales Killed

Alternative 2, the Tribe's proposal, would include a regulatory limit of seven strikes per year, which would limit the number of whales killed per year to seven. In contrast, Alternative 5 does not include a

[7] Some scouting days could result in hunting days if a whale is located by scouts and then hunted.

strike limit, but the mortality limit for PCFG whales in concert with the IWC limit on total catches would effectively limit the number of strikes per year, and thus the number of whales killed, to four per year on average, with a maximum of five in a single year. This maximum number would be reached in only three scenarios: 1) if the Tribe harvested the annual maximum (under the IWC catch limit) of 5 non-PCFG whales, 2) if the Tribe harvested four non-PCFG whales and then harvested a PCFG whale, or 3) if the Tribe harvested four non-PCFG whales and then struck and lost a fifth whale (assumed to have subsequently died).

Maximum and Likely Number of PCFG, OR-SVI, and Makah U&A Whales Killed

Some of the whales killed might be PCFG whales, and of those some might be OR-SVI and Makah U&A whales. Under Alternative 5, a mortality limit would be set on PCFG whales equivalent to 10 percent of PBR as reported in NMFS' most recent stock assessment report (Subsection 3.4.2.1.4, Defining and Calculating PBR). Table 4-9 illustrates how the limit would be calculated. Under current conditions, the PCFG mortality limit would be 0.27 whales. Because this limit represents less than one whale, it would differ from the mortality limits in other alternatives in that it would be allowed to accumulate across years for the purposes of calculating how frequently a PCFG whale could be killed or struck and lost. Although this PCFG mortality limit would always be less than one whale[8], the Tribe could hunt in any year—including the first year—until they either 1) kill a PCFG whale or 2) strike and lose any whale. If either of those two outcomes occur, then the PCFG mortality limit would be applied to determine the number of years during which the Tribe would need to take a hiatus from hunting (i.e., until the accumulated mortality limits would add up to at least one whale).

For example, if the Tribe killed a PCFG whale in the first year of hunting, then the PCFG mortality limit would be reduced to zero and there would be a hiatus until mortality limit calculations had accumulated (over subsequent years) to yield a value greater than or equal to one whale. In this example, and using current calculated values, the Tribe could not hunt again until year 5 because it would take 4 years for a PCFG mortality limit of 0.27 whales to reach at least one whale (i.e., 0.27 whales/year times 4 years = 1.08 whales).

Alternatively, if the Tribe strikes and loses any whale in the first year of hunting then the PCFG mortality limit would be reduced from one whale by a fraction equal to the proportional presence of PCFG whales in the coastal portion of the Makah U&A during the season in which it was struck (e.g.,

[8] Even if the recovery factor used to calculate this estimate were doubled, the resultant PCFG mortality limit would still be less than 1.0 whale (unless the minimum population estimate were to nearly double to 321 animals, which is highly unlikely given that all estimates to date have been less than 205 animals).

0.40 whales in the spring when the Tribe is most likely to hunt). As a result, if a whale is struck and lost during the spring then the result would be a reduction in the PCFG mortality limit to 0.60 whales (1 whale minus 0.40 whales) and the Tribe could not hunt again until year 3 when the mortality limit calculations had accumulated to yield a value greater than or equal to one whale (i.e., 0.60 whales plus 0.27 whales in each of years 2 and 3 = 1.14 whales, which would be rounded down to 1.0 whale). And if the Tribe strikes and loses a whale in year 3 then hunting could not resume until year 5, and so on (i.e., hunting could occur every other year under this continued struck-and-lost scenario).

In the case of either a killed whale or a struck-and-lost whale, if new information (such as a change in the minimum population size estimate) during the hiatus period changes the PCFG mortality limit it could affect the length of that hiatus. For example, in the scenario above for a killed whale, if the PCFG mortality limit was 0.27 whales in the year of the kill but increased to 0.34 in subsequent years, then the Tribe would only need to take a 3-year hiatus from hunting (i.e., 0.34 whales/year times 3 years = 1.02 whales, which would be rounded down to 1.0 whale).

Table 4-9. Alternative 5 method of calculating PCFG mortality limits.

Element	Current Value	Source for Establishing Value in Future Calculations[a]	Notes
One-half maximum net productivity rate (Rmax)	(½) 0.062 = 0.031	NMFS' Stock assessment report (Carretta et al. 2014)	See Subsection 3.4.2.1.4, Defining and Calculating PBR
Minimum population abundance of PCFG (Nmin)	173	NMFS' Stock assessment report (Carretta et al. 2014)	See Subsection 3.4.3.4.3, PCFG Abundance and Trends
Recovery factor for PCFG	0.5	NMFS' stock assessment report (Carretta et al. 2014)	See Subsection 3.4.2.1.4, Defining and Calculating PBR
CURRENT RESULT	Total Mortality: (0.031) * (173) * 0.5 = 2.7 * 0.10 = **0.27**		

[a] Values for the elements used in this calculation are derived from NMFS Stock Assessment Reports, the most recent of which is Carretta et al. (2014). These values may change as new information becomes available. It is also possible that future reports could discontinue reporting values for PCFG whales. In that case, NMFS would base these calculations on an alternative source(s) for the best available scientific information regarding PCFG whales.

Using the struck and lost example above and assuming that every struck-and-lost whale was in fact a PCFG whale that died, then the *maximum* number of PCFG whales that might be killed under Alternative 5 would be approximately 0.5 whales per year (i.e., one whale every other year). However, it is unlikely that would actually be the case given the proportion of PCFG whales present in the Makah

U&A during the spring portion of the hunting season when the Tribe is most likely to hunt (Table 4-10). Taking into account that spring proportion yields a more *likely* estimate of one PCFG whale that is struck and lost (and dies) every 5 years.[9] If the Tribe also hunted in the winter, it is uncertain what the proportion of PCFG whales would be; thus, there could be more or fewer whales killed (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements).

Likelihood of Striking a WNP Whale

The split hunting season under Alternative 5 is designed to avoid the potential for striking a WNP whale during times that are outside the June through November season that defines the PCFG. However, there are very limited data for WNP whales in the project area to inform this analysis (Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements). Therefore, we calculated the likelihood of a Makah hunt striking (killing) a WNP gray whale (Table 4-10) based on estimates derived from modeling by Moore and Weller (2013) using strike/attempt/approach estimates specific to this alternative (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014).

Likely Number of ENP Whales Harvested

For a variety of reasons, it is extremely unlikely the Tribe would harvest an average of four whales per year over 6 years under Alternative 5. As described above in this subsection, the limit on PCFG whales under current conditions would be 0.27 per year, or one PCFG whale every 4 years. Given that the proportion of PCFG whales present in the coastal portion of the Makah U&A during the spring hunting season is 40 percent, the chances are that one out of about every three whales struck would be a PCFG whale. If the Tribe harvested a PCFG whale, there would be a 3-year hiatus for the PCFG mortality limit to re-set at one whale. If the Tribe struck and lost a whale, it would count as 0.40 of a PCFG whale and there would be a 1-year hiatus for the PCFG mortality to re-set at one whale.

In addition to the constraints imposed by the PCFG mortality limit, the hunting season of 22 days in May would make it difficult for the Tribe to harvest more than one whale. For these reasons, we assume under Alternative 5 that if the Tribe successfully harvested a non-PCFG whale it would end the hunt for that year rather than risk killing a PCFG whale; thus, one would likely be the maximum number of whales harvested in a year. Given the odds that one PCFG whale would likely be struck every third attempt (and the condition that killing a PCFG whale would invoke a 3-year hiatus), the

[9] This is estimated by dividing one "successful" strike on a PCFG whale by the 40 percent chance of that strike actually being on a PCFG whale, which yields 2.5 strike attempts (rounded to 3 strike attempts). Because hunting could only occur every other year under a struck-and-lost scenario, it would take 5 years to make 3 strike attempts and achieve the expected strike of one PCFG whale.

Tribe might harvest a whale in 3 out of 6 years if it did not strike and lose any whales. For Alternative 5, we therefore assume the harvest might be zero to one whale per year.

4.1.5.4 Potential Number of Unsuccessful Harpoon Attempts and Approaches

Under Alternative 2, we estimated that for each whale struck there would be six unsuccessful harpoon attempts, and for each day of hunting there would be 8.3 whales approached. A hunt under Alternative 5 would occur in the same area, within a subset of the same time period, and using the same methods as the hunt under Alternative 2. We therefore applied the same assumptions to a hunt under Alternative 5 as under Alternative 2 regarding the number of unsuccessful harpoon attempts per successful strike, and the number of whales approached per day of hunting (Subsection 4.1.2.4, Potential Number of Unsuccessful Harpoon Attempts and Approaches).

Under Alternative 5, with a maximum of five strikes annually (but an average of four per year over 6 years), there might be 24 unsuccessful harpoon attempts (four strikes times six unsuccessful harpoon attempts). With a potential for as many as 14.7 hunting days per year, the potential number of times that tribal hunters might approach a whale would be 122 (8.3 whales per day times 14.7 days). Some of these attempted strikes and approaches could be repeated incidents involving the same whale. We also estimated the number of instances in which PCFG, OR-SVI, and Makah U&A whales could be subjected to unsuccessful harpoon attempts or approaches by hunters. Under Alternative 5 there would be an annual PCFG mortality limit currently calculated at 0.27 whales. Given the struck and lost accounting described above (which factors in the proportional presence of PCFG whales and estimates one being struck every 5 years), we estimate 0.20 annual strikes on PCFG whales and use this value to estimate the number of unsuccessful harpoon attempts. The number of approaches on PCFG whales also takes into account the proportional presence of PCFG whales. Related approach and attempted strike estimates for OR-SVI and Makah U&A whales are based on the proportion of each subgroup of whales observed in the coastal portion of the Makah U&A during March through May (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements). The estimates are displayed in Table 4-10.

Finally, we estimated the likelihood of an unsuccessful harpoon attempt or approach involving a WNP whale. For these estimates we relied on modeling by Moore and Weller (2013), as described above (Subsection 4.1.5.3, Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested). The estimates are displayed in Table 4-10.

Table 4-10. Estimated number of strikes, unsuccessful harpoon attempts, and approaches of ENP, PCFG, OR-SVI, Makah U&A (MUA), and WNP whales under Alternative 5.

Whales		Number of Strikes		Number of Unsuccessful Harpoon Attempts[b]		Number of Approaches[c]	
		Annual	6-year	Annual	6-year	Annual	6-year
ENP		5[a]	24[a]	30	144	122	732
PCFG[d]	40.33%	0.20[e]	1.2	1.2	7.2	49	295
OR-SVI[d]	37.02%	0.18[f]	1.1	1.1	6.6	45	271
MUA[d]	33.15%	0.16[g]	1.0	1.0	5.9	40	243
WNP[h]		0.009	0.050	0.050	0.266	0.189	0.716

a. Limited by regulation and by the PCFG mortality limit and method of accounting for struck and lost whales as PCFG whales (five would be the maximum in any one year and no more than 24 could be struck over 6 years).
b. Calculated using number of unsuccessful harpoon attempts per successful strike (6:1), based on experience during 1999 and 2000 hunts combined.
c. Calculated using an estimate of 8.3 approaches per day of hunting and a high estimate of 14.7 hunting days (11.2 days in May plus 3.5 days in December).
d. Percentage estimates are based on the springtime whale analysis by Calambokidis et al. (2014) which compares whales seen in the spring to the entire catalog of whales identified in the PCFG range during the summer/fall feeding period (in contrast to the definition we use in this EIS for PCFG whales, which requires a whale to be have been seen in at least 2 years). This results in estimates that are likely higher and therefore more conservative than estimates that would be derived from a comparison with whales observed in at least 2 years. We conclude this conservative approach is appropriate as it allows for the possibility that a whale sighted in the spring might later be seen for the second time in the PCFG seasonal range. Note that OR-SVI and MUA are nested regions within the PCFG range.
e. Hunting would be managed so that the average annual mortality of PCFG whales would not exceed 10 percent of PBR (currently 0.27 whales per year). The values shown are based on the proportion of PCFG whales in the MUA during the spring and the estimate that one PCFG whale is struck every 5 years.
f. Based on the proportional presence (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements), 92 percent of PCFG whales in the MUA during March through May are also OR-SVI whales (0.3702 divided by 0.4033 = 0.92, and 0.92 times 0.20 = 0.18).
g. Based on the proportional presence (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements), 82 percent of PCFG whales in the MUA during March through May are also MUA whales (0.3315 divided by 0.4033 = 0.82, and 0.82 times 0.20 = 0.16).
h. Median probability based on modeling by Moore and Weller (2013) using strike/attempt/approach estimates specific to this alternative (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014).

4.1.5.5 Potential Number of Shots Fired or Grenade Explosions

For the reasons described under Alternative 2, we estimate there would be 16 rifle shots fired for each whale harvested. Thus, under Alternative 5 we would expect up to 16 shots fired per year (16 shots times one whale harvested) and up to 96 shots over a 6-year period. Also as described under Alternative 2, we estimate there would be three grenade explosions for each whale harvested. Thus, under Alternative 5, we would expect up to three grenade explosions per year and up to 18 explosions over a 6-year period.

4.1.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Alternative 6 would have the same conditions as Alternative 2 regarding the hunt area (coastal portion of the Tribe's U&A), hunting season (December 1 through May 31), and hunting methods. In contrast to Alternative 2, Alternative 6 would have different limits on strikes. Under Alternative 2, there would be a limit of seven strikes per year, while under Alternative 6 there would be a limit of 7 strikes over a 2-year period, or 3.5 strikes per year on average. Alternative 6 would also differ from Alternative 2 in the way in which the PCFG mortality limit would be calculated and the way in which struck-and-lost whales would be counted against the mortality limit (described in more detail below and displayed in Table 4-11). Finally, Alternative 6 would differ from Alternative 2 in the regulatory regime adopted, in particular that permits would be issued for a shorter term (3 years instead of 5) and the waiver of the take moratorium and implementing regulations that would last only 10 years. These and additional details are described in Subsection 2.3.6, Alternative 6 (Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits).

4.1.6.1 Potential Timing of a Hunt and Number of Hunting Days

Under Alternative 6, the hunting season would be the same as under Alternatives 2 and 3 (December 1 through May 31). Also under Alternative 6, the hunt area would be the same as under Alternative 2 (anywhere in the coastal portion of the Tribe's U&A) and the hunt methods would be the same as under Alternative 2 (use of a wooden canoe).

Because Alternative 6 would have the same conditions as Alternative 2 regarding the hunt area, season, and methods as Alternative 2, we assume there would be the same number of hunting days and scouting days under Alternative 6 as under Alternative 2:

- <u>Most likely: March through May</u>
  - 43.3 scouting days, 33.2 hunting days
- <u>Less likely: December through February</u>
  - 17.1 scouting days, 9.3 hunting days

Together these amount to 60 possible days of hunt-related trips (including scouting effort) from December through May. For the reasons described under Alternative 2, this number may be an overestimate.

4.1.6.2 Potential Number and Types of Vessels

The hunt under Alternative 6 would involve the same number and types of vessels as the hunt under Alternative 2.

4.1.6.3 Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested

Potential Number of ENP Whales Killed

Under Alternative 6, the maximum number of whales that could be killed per year by the Tribe would be determined by the total limit on strikes, which would be not more than four in a single year and seven over 2 years (or 3.5 per year on average). Thus, the maximum number of whales that could be killed would be four in a single year, seven over 2 years, and 3.5 per year on average.

Maximum and Likely Number of PCFG, OR-SVI, and Makah U&A Whales Killed

Some of the whales killed might be PCFG whales, and of those some might be OR-SVI and Makah U&A whales. Under Alternative 6, a limit would be set on PCFG mortality equal to NMFS' calculation of PBR in its most recent stock assessment report (Subsection 3.4.2.1.4, Defining and Calculating PBR), minus other sources of human-caused mortality. Table 4-11 illustrates how the limit would be calculated. The mortality limits using the current values for the PBR formula and current levels of human-caused mortality would be 2.0 whales total. Because the mortality limit would be set each year, fractions of whales or unused whales would not be carried over to a subsequent year.

Table 4-11. Alternative 6 method of calculating PCFG mortality limits.

Element	**Current Value**	**Source for Establishing Value in Future Calculations[a]**	**Notes**
One-half maximum net productivity rate (Rmax)	(½) 0.062 = 0.031	NMFS' Stock assessment report (Carretta et al. 2014)	See Subsection 3.4.2.1.4, Defining and Calculating PBR
Minimum population abundance of PCFG (Nmin)	173	NMFS' Stock assessment report (Carretta et al. 2014)	See Subsection 3.4.3.4.3, PCFG Abundance and Trends
Recovery factor for PCFG	0.5	NMFS' stock assessment report (Carretta et al. 2014)	See Subsection 3.4.2.1.4, Defining and Calculating PBR
Other sources of human-caused mortality	0.45	NMFS' Stock assessment report (Carretta et al. 2014)	See Subsection 3.4.3.4.4 PCFG Status, Carrying Capacity (K), and Related Estimates
CURRENT RESULT	Total Mortality: (0.031) * (173) * 0.5 = 2.7 – 0.45 = **2.25**		

[a] Values for the elements used in this calculation are derived from NMFS Stock Assessment Reports, the most recent of which is Carretta et al. (2014). These values may change as new information becomes available. It is also possible that future reports could discontinue reporting values for PCFG whales. In that case, NMFS would

base these calculations on an alternative source(s) for the best available scientific information regarding PCFG whales.

Under Alternative 6, the limit on the maximum number of PCFG whales killed would be equal to the overall strike limit. While 3.5 would, on average, be the *maximum* number of PCFG whales that might be killed each year under Alternative 6, it is unlikely that many would actually be killed given the proportion of PCFG whales present in the Makah U&A during the spring portion of the hunting season, when the Tribe is most likely to hunt. The proportion of PCFG whales in the Makah U&A during the winter portion of the hunting season is unknown. This analysis therefore also considers the *likely* number of PCFG whales that might be killed per year, if the full number of strikes were to occur during the spring. The calculation is based on the proportional presence of PCFG whales in the coastal portion of the Makah U&A during the likely timing of a Makah hunt (March through May). In addition, the analysis considers the likely number of OR-SVI and Makah U&A whales that might be killed in a tribal hunt, if the full number of strikes were to occur during the spring portion of the hunting season.

During the period 1996 to 2012, 40.33 percent of whales identified from March through May in the northern Washington coast survey area were PCFG whales, 37.02 percent were OR-SVI whales, and 33.15 percent were Makah U&A whales (Subsection 3.4.3.4.3, PCFG Abundance and Trends). If an average of 3.5 whales were killed per year under Alternative 6, the likely number of PCFG whales that would be killed would be 1.4 (an average of 3.5 whales killed times 40.33 percent), the likely number of OR-SVI whales killed would be 1.3 (an average of 3.5 whales killed times 37.02 percent), and the likely number of Makah U&A whales killed would be 1.2 (an average of 3.5 whales killed times 33.15 percent). These numbers are subsets of one another (the OR-SVI is contained in the PCFG area and the Makah U&A is contained in the OR-SVI area) (Figure 3-10) so are not additive. These estimates are also displayed in Table 4-12.

If the Tribe also hunted in the winter, it is uncertain what the proportion of PCFG whales would be; thus, there could be more or fewer PCFG, OR-SVI, or Makah U&A whales killed. However, because all struck and lost whales would be counted against the PCFG limit, the average maximum number of PCFG whales that could be killed per year would be 3.5, as described above.

Likelihood of Striking a WNP Whale

We calculated the likelihood of a Makah hunt striking (killing) a WNP gray whale based on 3.5 strikes per year during the spring and using the analysis from Moore and Weller (2013) described above under Alternative 2. Table 4-12 shows the probability of a WNP whale being struck. The estimates are derived from modeling by Moore and Weller (2013) using strike/attempt/approach estimates specific to this alternative (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014).

Likely Number of ENP Whales Harvested

Under Alternative 6, the limit of seven strikes over 2 years would limit the maximum number of whales harvested to seven over 2 years, or 3.5 per year on average.

4.1.6.4 Potential Number of Unsuccessful Harpoon Attempts and Approaches

Under Alternative 2, we estimated that for each whale struck there would be six unsuccessful harpoon attempts, and for each day of hunting there would be 8.3 whales approached. A hunt under Alternative 6 would occur in the same area, within the same time period, and using the same methods as the hunt under Alternative 2. We therefore applied the same assumptions to a hunt under Alternative 6 as under Alternative 2.

Under Alternative 6, with a maximum average of 3.5 strikes per year, there might be 21 unsuccessful harpoon attempts (3.5 strikes times six unsuccessful harpoon attempts). With up to 33.2 hunting days per year in the spring, the potential number of times that tribal hunters might approach a whale would be 276 (8.3 per day times 33.2 days). If tribal members hunted during the winter as well, there could be an additional 77 approaches (8.3 per day times 9.3 days) for a total of 353 approaches per year. Some of these attempted strikes and approaches could be repeated incidents involving the same whale. We also estimated the number of instances in which PCFG, OR-SVI, and Makah U&A whales could be subjected to unsuccessful harpoon attempts or approaches by hunters. For these estimates, we multiplied the number of strikes and approaches times the proportion of each subgroup of whales observed in the coastal portion of the Makah U&A during March through May (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements). The estimates are displayed in Table 4-12.

Finally, we estimated the likelihood of an unsuccessful harpoon attempt or approach involving a WNP whale. For these estimates we relied on modeling by Moore and Weller (2013), as described above (Subsection 4.1.6.3, Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested). The estimates are displayed in Table 4-12.

Table 4-12. Estimated numbers of strikes, unsuccessful harpoon attempts, and approaches of ENP, PCFG, OR-SVI, Makah U&A (MUA), and WNP whales under Alternative 6.

Whales		Number of Strikes[a]		Number of Unsuccessful Harpoon Attempts[b]		Number of Approaches[c]	
		Annual	6-year	Annual	6-year	Annual	6-year
ENP		3.5	21	21	126	353	2,117
PCFG	40.33%[d]	1.4	8.5	8.5	50.8	142	854

OR-SVI	37.02%[d]	1.3	7.8	7.8	46.6	131	784
MUA	33.15%[d]	1.2	7.0	7.0	41.8	117	702
WNP[e]		0.006	0.036	0.036	0.195	0.455	0.974

a. Limited by regulation.
b. Calculated using the number of unsuccessful harpoon attempts per successful strike (6:1), based on experience during the 1999 and 2000 hunts combined.
c. Calculated using an estimate of 8.3 approaches per day of hunting and a total of 42.5 hunting days per year.
d. Percentage estimates are based on the springtime whale analysis by Calambokidis et al. (2014) which compares whales seen in the spring to the entire catalog of whales identified in the PCFG range during the summer/fall feeding period (in contrast to the definition we use in this EIS for PCFG whales, which requires a whale to be have been seen in at least 2 years). This results in estimates that are likely higher and therefore more conservative than estimates that would be derived from a comparison with whales observed in at least 2 years. We conclude that this conservative approach is appropriate as it allows for the possibility that a whale sighted in the spring might later be seen for the second time in the PCFG seasonal range. Note that OR-SVI and MUA are nested regions within the PCFG range.
e. Median probability based on modeling by Moore and Weller (2013) using strike/attempt/approach estimates specific to this alternative (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014).

4.1.6.5 Potential Number of Shots Fired or Grenade Explosions

For the reasons described under Alternative 2, we estimate there would be 16 shots fired for each whale harvested. Thus, under Alternative 6 we would expect up to 56 shots fired per year on average (16 shots times 3.5 whales harvested on average) and up to 336 shots over a 6-year period. Also as described under Alternative 2, we estimate there would be 3 grenade explosions for each whale harvested. Thus, under Alternative 6 we would expect up to 10.5 (rounded up to 11) grenade explosions per year and up to 63 explosions over a 6-year period.

4.2 Water Quality

4.2.1 Introduction

This subsection addresses the potential for the alternatives to affect water quality in the project area, including marine water and groundwater. No hunt-related activities would take place above the high-tide line, so there is no potential to affect surface water quality, including streams and tributaries in Water Resource Inventory Areas 19 and 20. Two issues pertain to the potential effects on water quality of whale hunt-related activities. First is the potential for spills of vessel fuel or other contaminants as a result of collisions or other incidents involving marine vessels associated with the hunt, including observers and protesters. Second is the potential for groundwater contamination because of leaks of fluids from whale carcasses or tissues that may be disposed of eventually in a landfill. The method for disposing of any unused portions of harvested whales could include towing out to sea or disposal in a landfill (currently located several hundred miles inland in Klickitat County, Washington) (refer to Subsection 3.2.7, Solid Waste Disposal). This analysis addresses the effects of temporary storage at the

Makah transfer station. Effects of disposal at sea are addressed in Subsection 4.3, Marine Habitat and Species.

None of the alternatives has the potential to affect drinking water quality, because no hunt-related activities would have the potential to affect current or future drinking water sources in the project area. The potential effects on water quality for the marine aquatic ecosystem (other than effects that might be related to spills, which are discussed in Subsection 4.2.2.1, Spills, below) would be negligible because the amount and longevity of any toxins would be minimal. Similarly, there would be no potential for any long-term effects on the management of shellfish beds in the project area because any contaminants found in whales would have no potential to affect shellfish management. The following subsections discuss these points in greater detail.

4.2.1.1 Drinking Water Sources

As described in Subsection 3.2.4, Drinking Water Sources, all drinking water in the project area comes from surface water sources. Limited availability of suitable drinking water led to a moratorium on new residential and commercial building on the reservation in 2000. Under the action alternatives, activities related to hunting and butchering whales would occur in marine or intertidal areas and therefore would not expose any current drinking water sources to whale-derived contaminants. Of the three potential future water sources identified in Subsection 3.2.4, Drinking Water Sources, two are surface water and would likewise be unaffected. The third option is a desalinization plant at the outlet of the Wa'atch River. The mechanism used to treat the water at such a plant (reverse osmosis) would produce water that meets federal standards for drinking water even if contaminants are present at the water collection site (for example, reverse osmosis is used to polish secondary effluent from wastewater treatment plants, rendering it suitable for use as drinking water). Therefore, there is no potential for whale-derived contaminants to affect any of the potential future drinking water sources that have been identified in the project area. Temporary storage of whale carcass material at a transfer station would have the potential to affect only groundwater, so no drinking water sources could be affected. The potential effects on groundwater are discussed in Subsection 4.2.2.2, Groundwater Contamination.

4.2.1.2 Marine Waters

In marine and intertidal waters, whale hunting and butchering under the action alternatives would produce two broad classes of potential contaminants: organic material (e.g., blood, lymph, and digestive tract contents) and bioaccumulated contaminants (e.g., PCBs, DDT). During a successful whale hunt, the initial strike and kill would be expected to release substantial amounts of organic matter, which would continue to leak out of the carcass as it is hauled to the beach. The likely effects of this material would be attraction of predators to the blood scent, avoidance of blood by common prey fish species, and secondary effects of decreased dissolved oxygen associated with the breakdown of the organic material by marine bacteria. These effects would extend over a relatively short period (likely several hours) and would have a very low probability of affecting the marine environment in any detectable manner for more than a day or two.

Any bioaccumulated contaminants in a whale carcass would be associated primarily with whale blubber, most of which would be removed and used for subsistence or ceremonial purposes. As described in Subsection 1.4.2 (Summary of Recent Makah Whaling — 1998 through 2007), following the successful hunt in 1999, Makah tribal members removed almost all edible portions of the meat and blubber from the whale within approximately 12 hours of towing the whale to shore. Under the action alternatives, if hunting and butchering were to proceed as they did in 1999, there would be little opportunity for contaminant release into the environment through decomposition while a whale is on the beach because the portions with the highest concentrations of contaminants (primarily blubber) would be removed in approximately 12 hours. If the unused portions of the carcass were towed out to sea for post-harvest disposal, some bioaccumulated contaminants might be released into the marine ecosystem. The amount of toxins released from a flensed carcass, however, would be substantially less than the amount from a whale that died and decomposed entirely at sea. Given the size of the ocean area in which carcasses would be disposed, the removal of most of the blubber from carcasses prior to disposal, and the likely death and decomposition of some whales in the area naturally, the expected impact to the marine environment from carcass disposal would be negligible in any given year or over a period of years.

4.2.1.3 Shellfish Beds

As noted in Subsection 3.2.5 (Shellfish), shellfish beds can be closed to harvest because of the presence of human fecal coliforms or toxic algal blooms. Fecal coliforms are not harmful to shellfish, but may be used to indicate the presence of sewage-borne organisms (pathogens) that cause disease in humans. The release of fecal coliforms into intertidal waters, therefore, would have the potential to affect aquaculture or subsistence harvest of shellfish only if the Washington Department of Health or Makah Fisheries chose to close a beach to harvest as a precautionary measure. Under the action alternatives, butchering a whale on the beach might release fecal coliforms into the intertidal area, where filter-feeding shellfish could accumulate them. Fecal coliforms from a whale, however, do not indicate an elevated risk of the presence of human pathogens. In addition, fecal coliforms are freshwater organisms that typically start to die off within 12 to 48 hours of exposure to marine water.

Regarding toxic algal blooms, research in Puget Sound has not established a statistically significant link between natural or human activities and toxic algal blooms. There is no evidence to suggest that the death of a whale (an ongoing natural process) would affect the probability of a toxic algal bloom occurring and thus requiring a shellfish harvest closure.

Based on the information above, it is improbable that whale hunt-related activities under the action alternatives would lead to long-term closures of shellfish beds. If, through independent monitoring, the Washington Department of Health or Makah Fisheries found elevated levels of fecal coliforms and closed a beach (which would represent a cautious response to the presence of fecal coliforms in a whale carcass on the beach), the closure could last a few days.

4.2.2 Evaluation Criteria

Two criteria were used to determine the potential for effects on water quality under the alternatives. The first is the likelihood of an increase in the risk associated with fuel spills or the introduction of other toxic substances into the environment. The second is the likelihood of an increase in the risk associated with leakage from whale carcass material temporarily stored at the Makah Transfer Station.

4.2.2.1 Spills

Spills could result from collisions between vessels, equipment failure, or accidental release (e.g., while fueling or if a vessel capsized). No spills were reported from the 1999 and 2000 hunts, despite a collision between a protest vessel and a law enforcement vessel. If any spills occurred, effects would be minor and short-lived, even if they occurred in a semi-contained area such as Neah Bay. The volume of fuel or other contaminants carried by any hunt-related vessels would be miniscule compared to the volume of water in any potential receiving waters (e.g., Neah Bay, the Strait of Juan de Fuca, and the Pacific Ocean). A spill of fuel or similar fluids would not mix with water, but would form a thin layer on the surface, continually spreading while it evaporated, broke apart, was hydrolyzed by ultraviolet light, and was decomposed by bacteria. This would probably occur over hours or days. The nearshore portion of the Makah U&A corresponds largely with the area to be avoided for the OCNMS, which was designated with the intention of reducing the potential for catastrophic oil spills from large ships (greater than 400 gross tons) carrying large amounts of bunker fuel. Any vessels involved in whale hunts, protest activities, or law enforcement would be substantially smaller than that, so any spills in the Makah U&A would not violate the intention of the area to be avoided.

The risk of spills would depend primarily on the amount of hunt-related vessel traffic in the project area, including Makah vessels and associated protest, media, and law enforcement vessels. Vessels and aircraft associated with each hunt would likely be similar to those associated with the previous hunts, as described in Subsection 3.11.3.2.1, Atmospheric Noise. It is possible that the amount of vessel traffic associated with each hunting expedition (including observation, protests, law enforcement, and media coverage) would vary under the action alternatives. For example, hunts conducted during summer (i.e., under Alternative 4) could attract more observers, protesters, or media coverage than hunts at other times of year. Alternatives that allow more hunts might attract less public interest over time and therefore less media coverage. Because of the difficulty of predicting such variations and how they might affect the precise amount of vessel traffic, this analysis assumes that each hunting expedition would be accompanied by the same amount of vessel traffic.

The risk of spills might also depend on the hunting season. Hunts conducted during the winter months might face a higher risk of encountering unanticipated storms that could cause vessels to capsize, as compared with hunts conducted during the summer. Thus, the risk of spills is likely to depend on the number of days with hunt-related trips and the season when hunting occurs. Under any of the action alternatives, the risk from oil spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003) (Subsection 3.2.6, Spill Prevention).

4.2.2.2 Groundwater Contamination

As noted above, the method of disposing of any unused portions of harvested whales would either be disposal at sea or in a distant landfill after temporary storage at the Makah Transfer Station. The method would likely depend on the location where the whale was landed and butchered. Under the action alternatives, if any unused portions of whale carcasses were placed in the Makah Transfer Station, the potential would exist for contaminants from the carcass to leak and mix with groundwater. The risk of groundwater contamination would depend on 1) the concentration of water-soluble contaminants in the unused portions of the carcass, and 2) the amount of tissue delivered to the facility. The greatest concentrations of contaminants occur in blubber, most of which would be removed and used for subsistence or ceremonial purposes. Contaminants in any residual blubber on a carcass would likely be hydrophobic substances such as PCBs and DDT. If any such substances leaked at the Makah Transfer Station, they would adhere to soils and would have a very low probability of reaching groundwater in quantities likely to be toxic. Groundwater, however, does not serve as a drinking water source in the project area.

It is not possible to predict in advance the proportion of harvested whale carcasses that would be disposed of via the Makah Transfer Station, the amount of material on any of those carcasses, or the concentration of contaminants in any of those carcasses. Therefore, the most reliable indicator of the potential risk of groundwater contamination is the number of whales that would be harvested under a particular alternative. This number would depend primarily on harvest limits. In addition, restrictions on hunting seasons and on the harvest of identified whales might affect the Tribe’s ability to harvest the full limit allowed.

4.2.3 Evaluation of Alternatives

The following subsections consider the potential for the alternatives to pose risks to water quality in the project area. For each alternative, the discussion addresses the potential number of occasions on which hunt-related activity may pose a risk of spills, and the potential amount of waste material from harvested whales that may pose a risk of groundwater contamination.

The lowest risk of adverse effects on water quality would occur under the No-action Alternative, because no whale hunts would be permitted. The risk under the action alternatives would increase compared to the No-action Alternative, with the amount of increase dependent on the number of days of scouting and hunting, the hunting season, and the number of whales harvested. Table 4-1 identifies the number of likely days of hunting and the number of whales likely to be harvested under each alternative, and Subsection 4.1, Introduction, describes the rationale for those numbers.

Compared to the No-action Alternative, the risk of spills would increase under any of the action alternatives because of increases in vessel traffic on days when tribal members are scouting or hunting for whales. The greatest increases in the risk of spills would occur under Alternatives 2, 3, and 6, under which hunt-related trips would likely occur on approximately 60 days from December through May when vessels might encounter unanticipated storms and capsize. The increased risk of spills would be lower under Alternative 5 than under Alternatives 2, 3, and 6 because hunt-related trips would likely occur on approximately 22 days in December and May. The increased risk would be even lower under Alternative 4, under which hunt-related trips would likely occur on only 7 days. In addition, hunt-related trips under Alternative 4 could be conducted during the summer months, when the risk of vessels capsizing in unanticipated storms would be reduced compared to the other action alternatives.

As described above, the most reliable indicator of the potential risk of groundwater contamination is the number of whales that would be harvested under a particular alternative. The No-action Alternative carries the least risk of groundwater contamination because no whales would be delivered to a distant landfill via the Makah Transfer Station beyond those that might be delivered under current conditions (e.g., the possible disposal of a stranded animal). Under Alternative 4, the number of whale carcasses could increase, relative to the No-action Alternative, by a maximum of one per year (under current conditions). The maximum potential increase in the number of whale carcasses delivered to the Makah Transfer Station would be greater under the other action alternatives, ranging from 3.5 per year (i.e., 7 every 2 years) under Alternative 6 to as many as 5 per year under Alternatives 2, 3, and 5. However, as discussed in the individual analyses below, the actual number would likely be less because of restrictions on mortality of PCFG whales.

Also, under Alternative 6, the waiver of the MMPA take moratorium and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

4.2.3.1 Alternative 1, No Action

Under the No-action Alternative, no Makah whale hunt would be authorized and no whale hunting or associated activities (such as vessel traffic, protests, whale butchering, and carcass disposal) would be expected to occur in the project area. Therefore, the amount of marine vessel traffic and the risk of spills in the project area would not differ from current levels. With the possible exception of waste material from drift whales (which could be towed out to sea or disposed of on land), no whale tissue or carcasses would be delivered to the Makah Transfer Station. If any leakage occurred at the station, the effluent would not be different from current conditions and the risk of groundwater contamination would remain at current levels under the No-action Alternative.

4.2.3.2 Alternative 2, Tribe's Proposed Action

Under Alternative 2, vessel traffic associated with hunt-related trips would be expected to occur on approximately 60 days from December through May, primarily during the spring. Compared to the No-action Alternative (under which there would be no hunt-related vessel traffic), this would result in an increased risk of fuels or other contaminants being released into the marine environment. As described above, because the vessels associated with hunting would be small, any spills would be localized and rapidly diluted to undetectable concentrations in the Pacific Ocean or local bays. Non-water-soluble contaminants such as petroleum-based fuels would disperse and break down in hours or days. Also, risks from spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003) (Subsection 3.2.6, Spill Prevention).

Under Alternative 2, effects to drinking water sources are expected to be negligible. The limit on the number of harvested whales would be an average of four whales per year over 6 years, with no more than five in any one year. The limit on the number of PCFG whales killed per year would be four, based on current population estimates (Table 4-3). In addition, only PCFG whales harvested, not whales struck and lost, would be counted toward that limit. It is therefore unlikely that limits on PCFG whale mortality would restrict the total number of whales harvested per year under Alternative 2. It is not possible to predict the proportion of carcasses from those harvested whales that may be disposed of in a distant landfill or the Makah Transfer Station, but the maximum number would correspond to the harvest limits (an average of four per year and no more than five in any single year). If any leakage occurred, the effluent might contain contaminants, which could enter groundwater. However, groundwater is not used as a source of drinking water in the project area. Thus, for the reasons described above, there would be no expected effect on drinking water sources.

4.2.3.3 Alternative 3, Offshore Hunt

Alternative 3 would include the same limits on the number of whales harvested as Alternative 2, but would prohibit Makah hunters from making an initial strike on a gray whale within 5 miles (8 km) of shore and would impose additional restrictions on the mortality of PCFG whales. As under Alternative 2, vessel traffic associated with hunt-related trips under Alternative 3 would likely occur on approximately 60 days from December through May. Compared to the No-action Alternative (under which there would be no hunt-related vessel traffic), this would result in an increased risk of fuels or other contaminants being released into the marine environment.

Compared to Alternative 2, the risk of fuels or other contaminants being released into the marine environment may be greater because the hunting party would likely be in a motorized vessel rather than a canoe, resulting in a greater number of motorized vessels engaged in each hunt-related trip. As described above, because the vessels associated with hunting would be small, any spills would be rapidly diluted to undetectable concentrations in the Pacific Ocean or local bays. Non-water-soluble contaminants such as petroleum-based fuels would disperse and break down in hours or days. Also, risks from spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003) (Subsection 3.2.6, Spill Prevention).

Under Alternative 3, effects to drinking water sources are expected to be negligible. The maximum number of whales that could be harvested under Alternative 3 would be the same as under Alternative 2 (an average of four per year, with no more than five in any one year). In contrast to Alternative 2, however, whales struck and lost would be counted toward the annual mortality limit for PCFG whales, potentially reducing the total number of whales that could be harvested in some years. Under some scenarios, it is possible that hunting activities for a given year could be curtailed before any whales are successfully harvested (Subsection 4.1.3, Alternative 3, Offshore Hunt). Compared to Alternative 2, it is therefore less likely that the Tribe would be able to harvest an average of four whales per year under Alternative 3. Alternative 3 could thus have a smaller increase (relative to the No-action Alternative) in the risk of groundwater contamination than would Alternative 2. However, groundwater is not used as a source of drinking water in the project area. Thus, for the reasons described above, there would be no expected effect on drinking water sources.

4.2.3.4 Alternative 4, Summer/Fall Hunt

Under Alternative 4, the hunting season would extend from June 1 through November 30 instead of December through May. The maximum number of whales harvested would be limited to one ENP male whale per year. Based on the expectation that locating and striking a known ENP male would take no more than 7 days (Subsection 4.1.4, Alternative 4, Summer/Fall Hunt), vessel traffic associated with hunt-related trips under Alternative 4 would be likely to occur on a total of 7 days per year. Compared to the No-action Alternative (under which there would be no hunt-related vessel traffic), Alternative 4 would result in an increased risk of fuels or other contaminants being released into the marine environment. The increase would, however, be smaller than under any of the other action alternatives because vessel traffic would be likely to occur on 7 days per year, compared to approximately 60 days per year under Alternatives 2 and 3. In addition, hunt-related trips under Alternative 4 could be conducted during the summer months when the risk of vessels capsizing in unanticipated storms would be reduced compared to the other action alternatives. Also, risks from spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003) (Subsection 3.2.6, Spill Prevention).

Under Alternative 4, effects to drinking water sources are expected to be negligible. The maximum number of whales that could be harvested under Alternative 4 (under current conditions) would be limited to one per year. It is possible, however, that no whales could be harvested in some years if tribal hunters are unable to locate and strike a known ENP male or if a whale is struck and lost (in which case the hunt would be ended for the year). Alternative 4 would therefore result in an increased risk of groundwater contamination from material delivered to the Makah Transfer Station, relative to the No-action Alternative, but the increase would be smaller than under any of the other action alternatives. However, groundwater is not used as a source of drinking water in the project area. Thus, for the reasons described above, there would be no expected effect on drinking water sources.

4.2.3.5 Alternative 5, Split-season Hunt

Under Alternative 5, the hunting season would be 3 weeks in December and 3 weeks in May, in contrast to the 6-month-long hunting seasons under the other action alternatives. In addition, the landing of a single PCFG whale, or the striking and losing of a single whale, would end the hunt for any given year.

Based on the length of the hunting season, vessel traffic associated with hunt-related trips under Alternative 5 would likely occur on a total of 22 days per year. This could decrease to 0 days in years in which the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale. Compared to the No-action Alternative (under which there would be no hunt-related vessel traffic), Alternative 5 would result in an increased risk of fuels or other contaminants being released into the marine environment. The increase would be greater than under Alternative 4 (which would be expected to result in 7 days of hunt-related vessel traffic per year) but less than under Alternatives 2, 3, and 6 (which would be expected to result in approximately 60 days of hunt-related vessel traffic per year). As under the other action alternatives, risks from spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003) (Subsection 3.2.6, Spill Prevention).

Under Alternative 5, effects to drinking water sources are expected to be negligible. Based on the constraints imposed by the hunting season and the PCFG mortality limit, it is expected that the Tribe would harvest up to one whale per year (Subsection 4.1.5, Alternative 5, Split-season Hunt). During years in which no whales are struck and lost, and no PCFG whales are killed, the maximum limit for the number of whales harvested would be the same as under Alternatives 2 and 3. Compared to the No-action Alternative, therefore, Alternative 5 would result in an increased potential for contaminants to enter groundwater. Under some scenarios, the potential increase could be as high as under Alternative 2, but the more likely increase would be similar to that expected for Alternative 4. However, groundwater is not used as a source of drinking water in the project area. Thus, for the reasons described above, there would be no expected effect on drinking water sources.

4.2.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Alternative 6 would have the same conditions as Alternative 2 regarding the hunt area, season, and methods and would, therefore, result in the same number of days (60) with hunt-related trips. Thus, the increased risk of fuels or other contaminants being released into the marine environment would be about the same as under Alternatives 2 and 3, compared to the No-action Alternative. As under the other action alternative, risks from spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003) (Subsection 3.2.6, Spill Prevention).

Under Alternative 6, effects to drinking water sources are expected to be negligible. Alternative 6 would include greater restrictions than Alternatives 2 and 3 on the maximum number of whales that could be killed per year and per 2 years, resulting in a maximum of 3.5 whales harvested per year on average. As a result, Alternative 6 would result in an increased potential, compared to the No-action Alternative, for contaminants to enter groundwater. This increase would be less than under Alternatives 2 and 3 (under which a maximum of four whales could be harvested per year on average) but greater than under Alternatives 4 and 5 (under which a maximum of one whale could be harvested per year). However, groundwater is not used as a source of drinking water in the project area. Thus, for the reasons described above, there would be no expected effect on drinking water sources.

4.3 Marine Habitat and Species

4.3.1 Introduction

This Subsection evaluates the potential for the six alternatives to affect marine habitat and associated biological resources within the project area. It includes a discussion of the likely ecological consequences of two possible types of effects that were identified through the internal and public scoping processes (Subsection 1.5.2.1, Marine Habitats and Species): 1) potential direct effects from hunt-related activities, such as disturbance associated with marine vessel traffic or disposition of whale carcasses, and 2) potential indirect effects resulting from the removal or harassment of gray whales from the local ecosystem, such as reduced benthic disturbance by feeding whales and decreased consumption of pelagic and epibenthic prey. Consistent with the description of marine habitat and associated species in Subsection 3.3, Marine Habitat and Dependent Species, this analysis separately examines the potential effects on pelagic and benthic habitats.

4.3.2 Evaluation Criteria

None of the action alternatives has the potential to appreciably affect the physical features and dynamic processes of the pelagic or benthic environments (described in Subsections 3.3.3.1, Pelagic Environment, and 3.3.3.2, Benthic Environment, respectively). The ocean currents, seasonal variability, upwelling, downwelling, eddies, fronts, El Niño Southern Oscillation events, and the Pacific Decadal Oscillation that influence the pelagic environment are large-scale, physical oceanographic and climatic processes that cannot reasonably be expected to be affected by the action alternatives, which involve comparatively small-scale, short-term, localized activities. Similarly, the substrata, features (e.g., submarine canyons), and physical disturbances that make up the benthic environment also are large-scale and cannot reasonably be expected to be affected by the small-scale, short-term, and localized activities associated with the action alternatives.

Consequently, the evaluation of the action alternatives below focuses on the potential direct and indirect effects on the biological resources associated with the pelagic and benthic environments. For both the pelagic and benthic environments, two criteria were used to determine the potential for effects. The first is the amount of physical disturbance associated with conducting a whale hunt (such as vessel traffic or towing a whale), which could have direct effects on the environment. The second is the change in pelagic or benthic communities in the project area, which could result if gray whales are removed from the project area. The following subsections discuss the potential effects in greater detail and how the effects for each alternative may be assessed and differentiated.

4.3.2.1 Pelagic Environment Evaluation Criteria

4.3.2.1.1 <u>Disturbance of Pelagic Species</u>

Hunt-related activities, such as vessel traffic or hauling of whale carcasses, could disturb fish or other pelagic species. This evaluation criterion relates to the potential risk that the action alternatives may affect the distribution and abundance of fish or other pelagic species in the project area. The amount of disturbance and any resulting change in fish distribution or abundance would depend primarily on the amount, distribution, and timing of hunt-related vessel traffic in the project area. The amount of anticipated vessel traffic would depend on the number of hunts initiated and how many whales could be struck or harvested under a given action alternative. The distribution of vessel traffic would depend on the hunt area and the specific location of pursued whales at the time of a hunt.

4.3.2.1.2 <u>Changes in the Pelagic Community</u>

This evaluation criterion relates to the potential ecological consequences of a whale hunt on the pelagic environment. If the consumption of pelagic prey by gray whales represents a significant factor in determining zooplankton species abundance or plays a significant role in structuring planktonic communities, it is possible that the abundance, species composition, and spatial distribution of pelagic organisms could be altered if whales were harassed in or removed from the project area. The amount of ecological change induced by a whale hunt would depend on the relative change in whale presence and prey consumption, as well as the importance of whale prey consumption relative to oceanographic/climatic processes in determining the dynamics of zooplankton species assemblages in the project area.

4.3.2.2 Benthic Environment Evaluation Criteria

4.3.2.2.1 <u>Disturbance of Benthic Habitat</u>

Potential direct impacts to the benthic habitat from hunting gray whales might result from disturbances associated with increased vessel traffic and disposition of carcasses (relative to the No-action Alternative). Such impacts could include 1) disturbance or damage to eelgrass, surfgrass, kelp beds, or kelp rafts; 2) an increase in the number or generation of kelp rafts; 3) disturbance to nearshore rocky and soft-bottom communities; and 4) disturbance or damage to shellfish resources. Each of these potential impacts is considered under the evaluation criterion for assessing disturbances to the benthic habitat and is described in more detail in the following paragraphs.

Hunt-related activities, such as nearshore vessel traffic and hauling whale carcasses, could result in the disturbance of marine plant or kelp beds at or near landing beaches. This analysis considers the frequency and severity of such hunt-related disturbances relative to the natural levels of physical disturbance in the project area. Additionally, the capacity of these marine plant and macroalgal species for growth and recolonization in response to disturbance is an important consideration. The amount of hunt-related disturbance would depend primarily on the amount of hunt-related vessel traffic in the project area. The amount of vessel traffic that may be expected would depend on the number of hunts initiated and how many whales could be struck or harvested under a given action alternative.

Floating rafts of kelp and associated biota occur within the project area. Kelp rafts are generated by storms and other disturbance events that dislodge kelp holdfasts from their attachment to the substratum. Although kelp rafts are free-floating and associated with the pelagic environment, they are considered in this analysis as part of the benthic habitat as they are the product of benthos disturbance. They are ecologically important to benthic communities as potential vectors of dispersal for benthic species and as possible sources of organic material upon sinking. Hunt-related activities such as vessel traffic could potentially generate kelp rafts by disturbing stands of kelp. Additionally, kelp rafts are susceptible to damage or disturbance if struck by the propellers of vessels associated with the hunt. Any hunt-related generation or disturbance of kelp rafts would occur in the context of background physical processes affecting the generation and disturbance of kelp rafts in the project area. The amount of hunt-related disturbance would depend primarily on the amount of hunt-related vessel traffic in the project area. The amount of vessel traffic that may be expected would depend upon the number of hunts initiated and the number of whales that could be struck or harvested under a given action alternative.

The hauling and landing of whale carcasses on rocky or soft-bottomed nearshore habitats could result in the disturbance of associated species and communities. This analysis considers the frequency and severity of such hunt-related disturbance relative to background levels of natural disturbance (e.g., storms, wave action, and predation). The amount of hunt-related disturbance would depend primarily on how many whales could be harvested under a given action alternative.

The landing of whale carcasses on beaches with shellfish resources could result in disturbance of these shellfish communities (the potential for hunt-related activities to result in the closure of beaches to shellfish harvest is evaluated in Subsection 4.2, Water Quality). This analysis considers the frequency and severity of such hunt-related disturbance relative to background levels of natural disturbance (e.g., storms, wave action, and predation). The amount of hunt-related disturbance to shellfish communities would depend primarily on how many whales could be harvested under a given action alternative.

4.3.2.2.2 Changes in Disturbance-dependent Benthic Communities

Potential indirect impacts on the benthic habitat from hunting gray whales may occur if benthic-feeding gray whales were harassed in or removed from the ecosystem. Such impacts include change in the relative level of benthic disturbance because of a decrease in the number of benthic-feeding gray whales and change in the abundance or distribution of benthic prey species because of a decrease in the quantity of benthic food consumed by gray whales.

If feeding-associated disturbance by benthic-feeding gray whales represented a significant factor in structuring benthic communities, benthic communities could be altered if whales were harassed in or removed from the project area. Background physical processes may include disturbance by storms, wave action, and movement and accumulation of sediments (e.g., turbidity currents). Background biological processes may include seasonality and variability of surface water productivity and delivery of organic material to the benthic communities. The amount of ecological change induced by a whale hunt would relate to changes in whale presence, as well as the importance of whale prey consumption relative to other physical and biological processes in determining the dynamics of benthic species assemblages in the project area.

This analysis also considers the potential ecological consequences of a whale hunt on the benthic environment. If the consumption of benthic prey by gray whales represents a significant factor in determining species abundance and distribution, the abundance, species composition, and spatial distribution of benthic food items might be altered if whales were removed from or harassed in the project area. The amount of ecological change induced by a whale hunt would relate to changes in whale presence and prey consumption, as well as the importance of whale prey consumption relative to other physical and biological processes in determining the dynamics of benthic species assemblages in the project area.

4.3.3 Evaluation of Alternatives

The following subsections consider the potential for the alternatives to affect pelagic and benthic habitats and associated biological resources in the project area. For each alternative, risks to both pelagic and benthic environments are discussed. The analysis evaluates potential effects resulting from direct disturbance and indirect ecological effects of a whale hunt under a given alternative.

The marine environment of the project area, as noted in Subsection 3.3.1, Introduction, is highly energetic, productive, and variable as a result of the dynamic physical oceanographic processes and the high levels of physical disturbance characteristic of the Washington coast. The abundance, recruitment, distribution, and variation in marine species and communities in the project area strongly reflect the underlying physical environment. When evaluated in the context of this energetic and dynamic environment, evaluation of the alternatives indicates that none of them has the potential to appreciably affect pelagic or benthic habitats or the associated organisms and communities. The following subsections discuss these conclusions in more detail.

4.3.3.1 Alternative 1, No Action

Under Alternative 1, the No-action Alternative, no whale hunt would be permitted, no associated activities (e.g., increased vessel traffic) would be expected to occur, and no whales would be harassed in or removed from the project area. The dynamic processes described in Subsection 3.3.3, Existing Conditions, would be expected to continue in both the pelagic and benthic environments. No direct disturbance resulting in the altered presence or abundance of fish or other pelagic species would be expected, nor would pelagic species or the community experience any indirect ecological consequences because there would be no hunting activities. Similarly, no direct disturbance would affect marine plant or kelp beds, kelp rafts, nearshore communities, or nearshore shellfish resources, nor would benthic species and communities experience indirect ecological effects.

4.3.3.2 Alternative 2, Tribe's Proposed Action

Whale hunts would be permitted under Alternative 2, resulting in an expected increase in hunt-related vessel traffic over the No-action Alternative, as well as the harassment or removal of whales from the project area. Hunt-related trips would be expected to occur on approximately 60 days per year under Alternative 2. An average of four whales could be harvested per year, with no more than five harvested in a single year. No more than seven whales could be struck per year, and no more than 42 could be struck over a 6-year period. No more than three whales could be struck and lost in any year. Limits on the hunting season (December 1 through May 31) may make it difficult for tribal members to harvest the full number of whales allowed. The hunt area would consist of the coastal portion of the Tribe's U&A.

4.3.3.2.1 Pelagic Environment

Compared to the No-action Alternative, Alternative 2 would likely result in an increased level of direct disturbance because of hunt-related vessel traffic on approximately 60 days per year. These activities and the hauling of an average of four carcasses of harvested whales might disturb fish or other pelagic species in the project area. Any such disturbance would, however, likely be minor (vessels are small and the area is large and highly energetic), local (limited to waters near the activity), and of short duration (minutes to hours). Because any disturbance would be minor, localized, and short-term, it would be unlikely to result in an appreciable change in the presence, distribution, or abundance of fish and other pelagic species in the project area, compared to the No-action Alternative.

This alternative would involve pursuit and hunting of gray whales, and it would likely result in harassment or removal of whales from the project area. As noted above, the potential ecological effect on pelagic species and assemblages of removing whales from the ecosystem would depend on 1) the relative change in whale presence and prey consumption and 2) the relative importance of whale prey consumption in determining the dynamics of zooplankton species assemblages in the project area.

The consumption of pelagic prey by gray whales is not likely a significant factor in structuring pelagic communities relative to the highly variable and energetic oceanographic and climatic processes characteristic of the project area. As discussed in Subsection 3.3.3.1, Pelagic Environment, the physical features and ephemeral, seasonal, interannual, and interdecadal physical oceanographic processes largely control the abundance, distribution, and species composition of pelagic prey in the region. However, even assuming that gray whales do play a substantial role in structuring pelagic communities, the potential relative change in the number of whales under this and the other action alternatives would probably not result in any appreciable ecological effects. The number of whales allowed to be removed represents less than 1 percent of the ENP gray whale population, many of which travel close to shore through the project area each year (Subsection 3.4.3.3.2, ENP Seasonal Distribution, Migration, and Movements). Furthermore, the number of whales potentially removed is substantially smaller than the observed levels of interannual variability in whale abundance within the project area. Consequently, any relative change in the quantity of pelagic prey consumed because of removal of whales under Alternative 2 would be negligible and lower than the expected levels of natural variability.

It is possible that hunting under Alternative 2 in the coastal portion of the Tribe's U&A could, over time, cause gray whales to use the area less frequently during the summer feeding period (Subsection 4.4.3.2.4, Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Survey Areas). Given that consumption of pelagic prey by gray whales is not likely a significant factor in structuring pelagic communities, as described above, even this outcome would not affect pelagic communities in the project area.

4.3.3.2.2 <u>Benthic Environment</u>

Compared to the No-action Alternative, an increased level of direct disturbance would probably occur under Alternative 2 because of hunt-related vessel traffic on approximately 60 days and the hauling of an average of four whale carcasses annually. The expected amount of disturbance to eelgrass, surfgrass, kelp beds, and shellfish communities would depend on the specific route of hunt-related vessels, as well as the location of these communities relative to the landing beach for any whale carcasses. The marine plant, macroalgal, and shellfish communities in the project area thrive in a highly energetic and disturbance-prone nearshore environment such that any hunt-related disturbance effects would likely be negligible relative to the high levels of natural background disturbance. Furthermore, the high capacity of these species for growth and recolonization suggests that hunt-related disturbance effects, if any, would be short lived. Similarly, any direct disturbance to kelp rafts would likely be negligible relative to the background physical processes affecting the generation and distribution of kelp rafts in the project area.

As discussed above, in evaluating the potential consequences for the pelagic environment of whale removal, the potential change in the number of whales under this and the other action alternatives would be small relative to the overall whale population and natural levels of variability in whale presence. Consequently, the removal of one to several whales per year would probably not appreciably change background levels of benthic disturbance or the quantity of benthic prey consumed. Furthermore, the best available information indicates that feeding aggregations (the whales) and feeding areas (the prey) are dynamic, with both small- and large-scale changes over time and space. Gray whales may play a role in structuring benthic and epibenthic communities in the project area, though the relative importance is unclear. Benthic communities are strongly affected by the presence of benthic features (e.g., submarine canyons), physical disturbance processes (such as storms, wave action, and the movement and accumulation of sediments), and ephemeral, seasonal, interannual, and interdecadal physical and biological processes affecting the delivery of organic material from productive surface waters.

Any whales struck and killed but lost would affect the benthic environment by providing “whale fall” microhabitats. This would also be the case for carcasses of any whales harvested and disposed of at sea. As a whale carcass decays on the ocean floor, it provides an ephemeral habitat associated with a unique and diverse invertebrate community. Whale falls occur naturally when individuals die and sink to the sea floor. Under Alternative 2, up to three whales may be struck and lost per year (presumably resulting in whale falls), and up to 18 whales may be struck and lost over a 6-year period. No estimates are available for the annual level of natural mortality that may occur within the project area. Such an estimate would be useful for establishing a background level of whale falls expected to occur naturally in the project area, enabling a comparison with the number of additional whale falls that might be generated under Alternative 2. Compared to the annual level of natural mortality for the ENP gray whale stock as a whole (with a population of some 20,000 and an estimated annual mortality rate of about 2 percent (Punt and Wade 2012), which works out to approximately 400 whales dying per year, most of which likely become whale falls either inside or outside of the project area), the addition of 3 whale falls annually would be minor.

4.3.3.3 Alternative 3, Offshore Hunt

Alternative 3 would include the same limits on total numbers of whales struck and harvested as Alternative 2, but would impose additional restrictions on the mortality of PCFG whales and would prohibit Makah hunters from making an initial strike on a gray whale within 5 miles (8 km) of shore. As under Alternative 2, an increased level of direct disturbance relative to the No-action Alternative would occur under Alternative 3 because of hunt-related vessel traffic on approximately 60 days.

In contrast to Alternative 2, whales struck and lost would be counted toward the annual mortality limit for PCFG whales, potentially reducing the total number of whales that could be harvested in some years. Under some scenarios, it is possible that hunting activities for a given year could be curtailed before any whales are successfully harvested (Subsection 4.1.3, Alternative 3). Compared to Alternative 2, therefore, it is less likely that the Tribe would be able to harvest and haul to shore an average of four whales per year under Alternative 3. The reduced likelihood that the full number of whales would be towed to shore would be expected to result in a smaller increase in effects relative to the No-action Alternative, compared to Alternative 2.

4.3.3.3.1 Pelagic Environment

The prohibition on making an initial strike within 5 miles (8 km) of shore would likely result in more hunting effort taking place farther off shore under Alternative 3 than under the other action alternatives. As a result, hunt-related vessel traffic could spend more time in the pelagic environment, with an attendant increase in the potential for disturbance of pelagic species compared to the No-action Alternative. Similar to Alternative 2, however, the risk of direct disturbance of fish and other pelagic species under Alternative 3 would be minor, localized, and of short duration. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 3 would not likely result in indirect ecological effects on pelagic communities. Thus, compared to the No-action Alternative, Alternative 3 would not be likely to result in an appreciable change in the presence, distribution, or abundance of fish and other pelagic species in the project area.

4.3.3.3.2 Benthic Environment

Similar to Alternative 2, the risk of direct disturbance of benthic marine plant, macroalgal, shellfish, and kelp raft communities under this alternative would be negligible relative to the high levels of background disturbance and the strong capacity of these species for growth and recolonization. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 3 would not be likely to result in indirect ecological effects on benthic communities. Thus, Alternative 3 would probably not result in an appreciable change in benthic communities compared to the No-action Alternative.

4.3.3.4 Alternative 4, Summer/Fall Hunt

Under Alternative 4, the hunting season would extend from June 1 through November 30 instead of December through May. The maximum number of whales harvested under current conditions would be one ENP male whale per year; because any whales struck and lost would count against the PCFG limit, the maximum number of whales struck and lost would also be one. Based on the expectation that locating and striking a known ENP male would take no more than 7 days (Subsection 4.1.4, Alternative 4), vessel traffic associated with hunt-related trips under Alternative 4 would be likely to occur on approximately 7 days per year. The effects of Alternative 4 on marine habitat and species would, therefore, be greater than under the No-action Alternative but less than under the other action alternatives.

4.3.3.4.1 Pelagic Environment

Compared to the No-action Alternative (under which there would be no hunt-related vessel traffic), Alternative 4 would result in an increased risk of direct disturbance of fish and other pelagic species. The increase would, however, be smaller than under any of the other action alternatives because hunt-related vessel traffic would be likely to occur on 7 days per year, compared to approximately 60 days under Alternatives 2 and 3. Similar to Alternative 2, this alternative would likely result in minor, local, and short-term effects on pelagic communities through direct disturbance. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 4 would not be likely to result in indirect ecological effects on pelagic communities. Thus, compared to the No-action Alternative, Alternative 4 would not be likely to result in an appreciable change in the presence, distribution, or abundance of fish and other pelagic species in the project area.

4.3.3.4.2 Benthic Environment

Similar to Alternative 2, the risk of direct disturbance of benthic marine plant, macroalgal, shellfish, and kelp raft communities under this alternative would be negligible relative to the high levels of background disturbance and the strong capacity of these species for growth and recolonization. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 4 is not likely to result in indirect ecological effects on benthic communities. Thus, Alternative 4 would probably not result in an appreciable change in benthic communities compared to the No-action Alternative.

4.3.3.5 Alternative 5, Split-season Hunt

Under Alternative 5, the hunting season would be 3 weeks in December and 3 weeks in May, in contrast to the 6-month-long hunting seasons under the other action alternatives. In addition, the landing of a single PCFG whale, or the striking and losing of a single whale, would end the hunt for any given year. Based on the length of the hunting season, vessel traffic associated with hunt-related trips under Alternative 5 would likely occur on approximately 22 days per year. This could decrease to 0 days in years in which the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale. Therefore, effects on marine habitat and species under Alternative 5 would likely be less than those described under Alternative 2.

4.3.3.5.1 Pelagic Environment

Compared to the No-action Alternative (under which there would be no hunt-related vessel traffic), Alternative 5 would result in an increased risk of direct disturbance of fish and other pelagic species. The increase would be greater than under Alternative 4 (which would be expected to result in 7 days of hunt-related vessel traffic per year) but less than under Alternatives 2, 3, and 6 (which would be expected to result in approximately 60 days of hunt-related vessel traffic per year). Any direct disturbance effects under this alternative on fish and other pelagic species would likely be local and short-term, for the same reasons as described under Alternative 2. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 5 would not be likely to result in indirect ecological effects on pelagic communities. Because Alternative 5 would be expected to result in fewer hunting expeditions and fewer whales removed from the project area than Alternatives 2, 3, or 6, it would have less potential for effects than those alternatives. Thus, Alternative 5 would probably not result in appreciable changes in the presence, distribution, or abundance of fish and other pelagic species in the project area compared to the No-action Alternative.

4.3.3.5.2 Benthic Environment

Any direct disturbance effects under this alternative on benthic marine plant, macroalgal, shellfish, and kelp raft communities would be negligible relative to the high levels of background disturbance and the strong capacity of these species for growth and recolonization, as described under Alternative 2. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 5 is not likely to result in indirect ecological effects on pelagic communities. Because Alternative 5 would result in fewer hunting expeditions and fewer whales removed from the project area than Alternatives 2, 3, and 6, it would have less potential for effects than these alternatives. Thus, Alternative 5 would probably not result in an appreciable change in benthic communities compared to the No-action Alternative.

4.3.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Alternative 6 would have the same conditions as Alternative 2 regarding the hunt area, season, and methods and would, therefore, result in the same number of days (60) with hunt-related trips. Alternative 6 would include greater restrictions than Alternative 2 on the maximum number of whales that could be struck, harvested, and struck and lost per year and per 2 years, resulting in a maximum of 3.5 whales killed (either harvested or struck and lost) per year on average. Therefore, effects on marine habitat and species under Alternative 6 would likely be the same as those described under Alternative 2, except that the number of whales harvested or struck and lost would be smaller. Also, under Alternative 6, the waiver of the MMPA take moratorium and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

4.3.3.6.1 Pelagic Environment

Compared to the No-action Alternative (under which there would be no hunt-related vessel traffic), Alternative 6 would result in an increased risk of direct disturbance of fish and other pelagic species. Based on the likely number of days with hunt-related trips, the increase would be similar to that expected under Alternative 2. As described under Alternative 2, the risk of direct disturbance of fish and other pelagic species under this alternative would be minor, localized, and of short duration. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 6 would not be likely to result in indirect ecological effects on pelagic communities. Thus, compared to the No-action Alternative, Alternative 6 would not be likely to result in an appreciable change in the presence, distribution, or abundance of fish and other pelagic species in the project area.

4.3.3.6.2 Benthic Environment

Similar to Alternative 2, the risk of direct disturbance of benthic marine plant, macroalgal, shellfish, and kelp raft communities under this alternative would be negligible relative to the high levels of background disturbance and the strong capacity of these species for growth and recolonization. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 6 would not be likely to result in indirect ecological effects on benthic communities. Thus, Alternative 6 would probably not result in an appreciable change in benthic communities compared to current conditions under the No-action Alternative.

4.4 Gray Whales

4.4.1 Introduction

This section addresses the potential for the alternatives to affect gray whales across a range of biological scales, from individual whales to entire stocks. The analysis considers potential effects on abundance and viability of the two recognized gray whale stocks—ENP and WNP—and further analyzes the ENP stock at the scale of gray whales in the PCFG range as well as the Makah U&A and Oregon to Southern Vancouver Island [OR-SVI] areas within the PCFG range. Although we have not recognized PCFG whales as a separate stock under the MMPA, the analysis also considers potential effects on their abundance and viability (biological concepts normally associated with a discrete stock) because: 1) the Tribe has proposed a management scheme that manages separately for PCFG whales (for example, by setting an allowable bycatch limit); 2) the IWC has concluded it is "plausible" that the PCFG is a demographically distinct feeding aggregation; and 3) we have concluded that the PCFG "may warrant consideration" in the future as a stock under the MMPA.

For whales using the Makah U&A and OR-SVI areas, the analysis considers potential effects on numbers of whales (for reasons described in Subsection 4.4.2.4, Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Areas). Our analysis does not consider the viability of whales using these survey areas because our stock assessment reports (e.g., Carretta et al. 2014) have not suggested that these smaller units may be stocks, the genetic information does not indicate that there could be stock structure below the PCFG, and monitoring of movements of photographically identified whales suggest that they use a larger feeding area than the Makah U&A and OR-SVI (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements).

For effects on individual whales, the analysis considers time to death and hunting efficiency (the ratio of harvested to struck-and-lost whales) associated with the alternative methods of striking and killing whales. These methods are limited to what NMFS considers reasonable options for striking and killing whales (Subsection 2.4.6, Employ Different Hunting Methods), including using either a toggle-point harpoon as the primary striking method and .50 caliber rifle (or .577 caliber) as the killing method, or using an explosive projectile as the striking and killing method. Alternative vessels to position the harpooner are also considered, with a wooden canoe being used in Alternatives 2, 4, 5 and 6 and a motorized vessel being used in Alternative 3.

Section 5, Cumulative Effects, considers whether the effects on gray whales that might result from implementing any of the alternatives would be likely to have cumulative effects in the context of past actions, other contemporaneous actions, or reasonably foreseeable future actions that may affect gray whales, such as other human or natural sources of mortality, potential development in the project area, or global climate change.

4.4.2 Evaluation Criteria

Five criteria were used to determine the potential for effects on gray whales under the alternatives: 1) change in abundance and viability of the ENP gray whale stock; 2) change in abundance and viability of the WNP gray whale stock; 3) change in abundance and viability of PCFG whales; 4) change in numbers of gray whales in the Makah U&A and OR-SVI survey areas; and 5) welfare of individual whales. The following sections discuss risks to gray whales at each of these scales and how the effects of the alternatives may be assessed and differentiated.

4.4.2.1 Change in Abundance and Viability of the ENP Gray Whale Stock

As described in Subsection 4.1, Introduction, the catch limit for the ENP gray whale stock set by the IWC for 2013 through 2018 would remain the same under all six alternatives—744 whales over 6 years (averaging 124 whales per year), with a limit of 140 whales in any one year. The difference among the alternatives is how much of that catch limit would be allocated to the Makah Tribe. Because it is likely the United States would transfer any unused share of the catch limit to Russia (Subsection 4.1.1, Alternative 1) and all six alternatives contemplate the same overall catch limit for the stock, all of the alternatives would have the same effect on the abundance and viability of the ENP gray whale stock as a whole.

Hunt-related stress on gray whales (particularly pursuit and unsuccessful harpoon attempts) under the five action alternatives would differ from the No-action Alternative if a Makah hunt resulted in a greater level of indirect mortality than a Chukotkan hunt. Indirect mortality would result if stress caused by hunting increased the whales' susceptibility to predation or disease and ultimately increased the level of mortality beyond whales directly killed during hunting (Subsection 3.4.3.5.2, Whale Response to Being Pursued). Gray whales being pursued by whale-watching vessels have been observed to change course and alter swimming speed and respiratory patterns, potentially indicating stress (Subsection 3.4.3.6.6, Vessel Interactions). We estimate that over a 6-year period under the Tribe's proposal, a maximum of 2,117 whales might be approached and 252 whales exposed to unsuccessful harpoon attempts (Table 4-4).

As described above, if no harvest is allocated to the Makah Tribe, the entire IWC catch limit of 744 gray whales over 6 years would likely be available for harvest by the Chukotka Natives of the Russian Federation. No information is available on the proportion of whales approached and subjected to unsuccessful harpoon attempts in the Chukotkan hunt. However, given the total number of ENP gray whales hunted, there is likely to be no appreciable difference in stress-related mortality between an alternative in which the Chukotka Natives harvest an average of 124 whales per year while the Makah harvest none (the No-action Alternative), and alternatives in which the Chukotka Natives harvest an average of 120 whales per year while the Makah harvest an average of 4 whales per year (the most the Makah can harvest under any of the action alternatives). Even if the Makah allocation is harvested by neither the Makah nor the Chukotka Natives, the difference among the alternatives in stress-related mortality is likely to be negligible, because the difference is seven fewer whales struck per year (per the

Tribe's proposal), which is less than 6 percent of the average number of ENP gray whales allocated for harvest by the Chukotkans.

The overall viability of a marine mammal stock that exhibits different life history traits, such as different feeding strategies, could be affected by the loss of components of the stock that exhibit such traits. In the case of ENP gray whales, it is possible that the viability of the stock as a whole depends on the existence and persistence of different feeding aggregations. Sighting data and diet studies indicate that ENP gray whales, including PCFG whales, have the ability to switch feeding areas over time (Subsection 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem), suggesting that the loss of a feeding aggregation such as the PCFG may not affect the viability of the overall ENP stock. This analysis considers the potential for actions to affect PCFG whales, and that analysis then is one component of the analysis of viability of the ENP stock.

4.4.2.2 Change in Abundance and Viability of the WNP Gray Whale Stock

The WNP gray whale stock is not targeted for harvest under any of the alternatives. As described in Subsection 3.4.3.2, Western North Pacific (WNP) Gray Whales, the IWC has not established a catch limit for WNP gray whales and these whales are not considered in the catch limit established for ENP gray whales (see above). The most recent population assessment of WNP gray whales (Cooke et al. 2013) estimates that there are approximately 140 individuals (excluding calves) in the WNP stock (with a 95 percent confidence interval of 134 to 146 animals). This assessment also reported that the average annual rate of increase was 3.3 percent over the last 10 years (2002 to 2012).

As described in Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements, very little is known about the migratory routes and wintering areas of WNP gray whales. However, recent research has discovered 27 cases where whales identified from the WNP have also been found in the ENP. This represents a significant proportion—approximately 19 percent—of the entire population of known WNP whales (Cooke et al. 2013). The sighting data available on WNP migrations and movements suggest that it is most likely that whales from this stock could be encountered in the coastal portion of the Makah U&A during the hunting season proposed by the Tribe under Alternative 2, perhaps with the exception of May 10 to 31 and December 1 to 21. The lack of WNP whale sightings during these periods, including active gray whale surveys in May within and adjacent to the Makah U&A, indicate it may be unlikely these whales would be encountered by Makah hunters during this timeframe. For all but one of the alternatives (Alternative 4, which was developed to completely avoid times when a WNP whale might be present) we estimate the likelihood of hunters killing a WNP gray whale if the maximum number of strikes were to occur and consider the potential implications on the abundance and viability of the WNP stock as a whole.

4.4.2.3 Change in Abundance and Viability of PCFG Whales

The analysis discusses effects on whales identified in the PCFG region, which consists of whales identified in the PCFG survey areas that range from Northern California to Northern British Columbia (Subsection 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales). Whales in the PCFG are relevant to our analysis because the IWC considers it plausible that they are a demographically distinct feeding group using a unique summer range, and NMFS has determined that the PCFG may warrant consideration as a distinct stock in the future. The PCFG is also relevant to the Makah's proposal (Alternative 2) because the Tribe proposes to set an allowable bycatch level that would apply to any whale identified in the PCFG seasonal range (not just whales seen in 2or more years). Only one alternative (Alternative 4) includes hunting regulations that would specifically target whales in the PCFG seasonal range, but only because doing so might be the best way to avoid impacts on WNP whales. The remaining action alternatives would seek to avoid mortality of PCFG whales through time and area restrictions, and to regulate impacts to PCFG whales through mortality limits.

As noted in Subsection 4.1, Introduction, all six alternatives are likely to result in the same level of harvest from the ENP gray whale stock as a whole because of transfer of any unused share of the catch limit to Russia. The alternatives vary, however, in the number of PCFG whales that might be affected by hunting. Under Alternative 1, no PCFG whales would be hunted in the Makah U&A. Under current conditions, Alternative 2 would have the greatest effect because it might result in a maximum of five PCFG whales killed per year. In comparison, under current conditions Alternatives 4 and 5 might kill a maximum of one PCFG whale per year while Alternatives 3 and 6 might result in 3 or 3.5 killed PCFG whales per year, respectively. In addition, Alternatives 2 to 6 vary in 1) the number of whales that may be struck and lost during hunting (we assume that whales that are struck will die), 2) the mortality limits on PCFG whales and how struck and lost whales would be allocated towards those limits, and 3) the timing and location of hunting. These variations may have different effects on the abundance of PCFG whales.

Subsection 3.4.3.4.3, PCFG Abundance and Trends, and Table 3-7, describe the abundance of PCFG whales. During June 1 through November 30, for 1996 to 2012, 656 unique whales were observed in the PCFG range. Table 3-7 also shows the numbers of unique whales observed in the PCFG survey areas each year from 1999 to 2012 (146 whales on average), the number that are newly seen (35 whales on average), and how many of those newly seen whales were seen in a subsequent year (14 whales on average[10]). As described in Subsection 3.4.3.4.3, PCFG Abundance and Trends, the numbers of newly

[10] For this estimate, we exclude 2012 because whales newly seen in that year have not had a chance to be re-sighted.

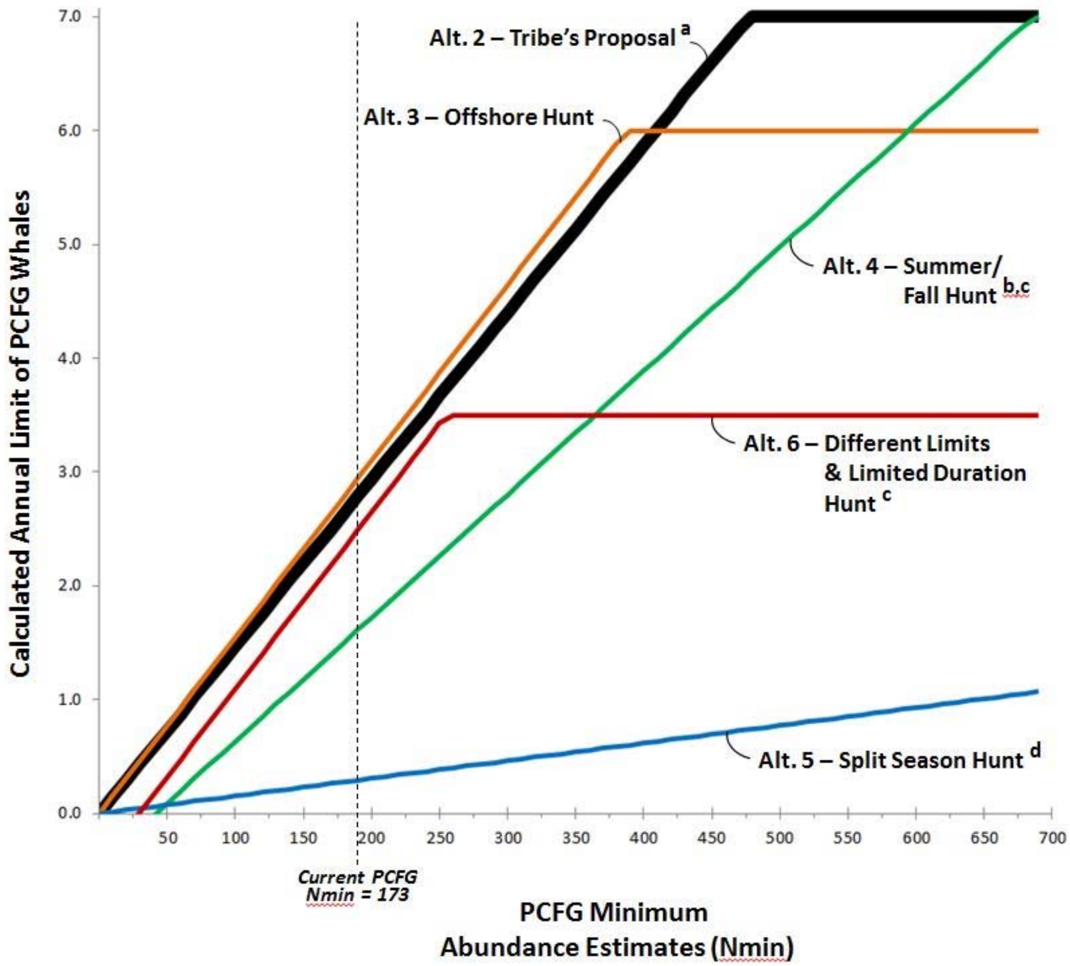
seen whales each year are variable (ranging from 8 to 69 whales) and only a rough approximation of the number of whales actually new each year for two reasons: there are likely more whales present each year than are photographed and identified, and it is likely that some whales were present in a previous year but were not photographed and identified. On average, 42 percent of the newly seen whales in the PCFG seasonal range were subsequently seen again and thought to have recruited into the PCFG. This information demonstrates that many new whales are seen each year in the PCFG seasonal range, and of these, variable but large numbers of whales are seen again. Similarly, variable but large numbers of whales are never seen again in the PCFG seasonal range.

In any given year in which PCFG whales were killed under Alternatives 2 through 6, the total abundance of PCFG whales would be reduced by the number of whales killed (either harvested or struck and lost). Over time, an ongoing hunt could reduce the abundance of PCFG whales, compared to the No-action Alternative. The extent to which a hunt would reduce abundance over time would depend on the number of PCFG whales killed and the rate at which new recruits would replace killed whales. As described in Subsection 3.4.3.4.1, PCFG Population Structure, new animals enter the PCFG as calves born to PCFG mothers (internal recruitment) or as non-calf immigrants (external recruitment). Whales are identified as calves when they are accompanied by their mother. Once the calf is weaned it may not be recognized as a calf. During the years 1999 to 2011, there were 14.3 new recruits on average annually, of which 12.5 were not identified as calves and 1.8 were identified as calves. The calf estimate could possibly be higher because some of the new whales may have entered the PCFG earlier as a calf and were not seen. Regardless of year-to-year variability in both internal and external recruits, alternatives that remove fewer whales are likely to have less effect on PCFG abundance in subsequent years because there are fewer whales to replace.

With respect to viability of the PCFG, a reduction in abundance of PCFG whales over time could decrease the likelihood that the PCFG is viable, compared to the No-action Alternative. As described in Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates, (IWC Implementation Review of PCFG Gray Whales), in 2012 the IWC's Scientific Committee evaluated the Makah hunt proposal (Alternative 2) using various versions of the proposal as candidate Strike Limit Algorithms (SLAs) and assuming a consistent level of non-hunting human-caused mortality. The analysis also incorporated 33 evaluation trials and 22 robustness trials (including one where harvests were strongly female-biased). In testing these and other SLA variants, the Scientific Committee did not reference the PCFG's viability per se but did draw conclusions about the PCFG's status with respect to carrying capacity (Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates).

The key management and conservation objectives in the IWC's assessment of aboriginal hunt requests includes ensuring they 1) do not seriously increase risks of extinction (highest priority), 2) enable hunts "in perpetuity," and 3) maintain stocks at the highest net recruitment level (and if below that, ensure they move towards it). The SLA variants are tested using a 100-year time horizon, so it is reasonable to conclude that when test results meet the IWC's conservation objectives for a group of whales, the number of strikes analyzed would not be expected to compromise the group's long-term viability. Therefore, the Scientific Committee's conclusions can be interpreted to mean that the Tribe could hunt, and PCFG whales would be viable, in perpetuity as long as the bycatch formula tested by the IWC is used to limit the strikes on PCFG whales (including struck and lost whales in May) and annual monitoring is conducted to assess the proportion of PCFG whales available to Makah hunters.

The Alternative 2 formula for setting a PCFG bycatch level currently yields a bycatch limit of 3.0 PCFG whales per year, which is greater than the likely number of PCFG whales that might be killed under any of the other action alternatives (0.20 to 2.8 whales per year). Because all of the alternatives would set a bycatch limit (Alternative 2) or mortality limit (Alternatives 3 through 6) for the PCFG using a formula that includes minimum abundance, the limit may change over time if the abundance of PCFG whales changes. Figure 4-1 shows the relationship of potential bycatch/mortality limits (relative to minimum abundance estimates) as calculated under the various action alternatives. As shown in Figure 4-1, Alternatives 2 (the Tribe's Proposed Action) and 3 (Offshore Hunt) have the potential for the fastest and greatest overall impact on PCFG whales (a maximum of six to seven whales killed per year) as PCFG population estimates increase. For comparison, Alternative 4 could also reach a maximum of seven killed PCFG whales but only in the unlikely case that the minimum abundance estimate reaches approximately 700 whales (which is more than three times the current estimate).



[a] Alternative 2 relies on Nmin estimates for OR-SVI whales; however, the line shown here uses values adjusted as a ratio of recent OR-SVI:PCFG Nmin estimates (1:1.36) to allow for a direct comparison with the other alternatives. (The Alternative 2 limit is a limit on landed PCFG whales, while the limits for other alternatives are mortality limits.)

[b] Under Alternative 4, calculated limits would be rounded down to 1.0 whales unless they were less than 1.0 but greater than 0.5, in which case fractional values would be carried over into the subsequent year.

[c] Alternatives 4 and 6 do not necessarily intercept at 0 because their formulas subtract other human-caused mortality (currently 0.45 whales/year) reported in the agency's stock assessment report.

[d] Under Alternative 5, fractional values are allowed to carry over into subsequent years; a single-year calculated limit of 1.0 PCFG whales could only be achieved in the unlikely event that the minimum abundance estimate of PCFG whales exceeded ~600 animals.

Figure 4-1. Comparison of calculated annual limits of PCFG whales under the various action alternatives using current estimates. The dashed vertical line intersects the current annual limit calculated for the various alternatives. (Note: The lines in this figure only reflect changes in calculated limits as the PCFG abundance estimates change; other parameters are kept constant for this comparison).

4.4.2.4 Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Areas

This analysis considers effects on gray whales in two areas that are subsets of the survey areas in the PCFG range: 1) the Makah U&A, which includes the northern Washington coast and Strait of Juan de Fuca survey areas, and 2) the OR-SVI, which includes the Makah U&A as well as adjacent coastal survey areas from Oregon to southern Vancouver Island (including the Strait of Juan de Fuca but excluding interior waters of Puget Sound). As directed by the court in *Anderson v. Evans* (2004) and described in Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements, this analysis considers likely effects of the alternatives on the number of gray whales present during the summer period in these survey areas as a way to evaluate local effects. The areas chosen do not necessarily correspond to areas that are biologically meaningful to individual whales or groups of whales, but they are nevertheless useful for analyzing local effects because of their overlap with the proposed hunt area.

Although all of the action alternatives restrict hunting to the coastal portion of the Makah U&A, the analysis of all of the alternatives considers gray whale numbers in both portions (coastal and Strait of Juan de Fuca) of the Makah U&A. This is because of the overlap of whales identified in both areas. If there were a decrease in the number of whales using the coastal portion of the Makah U&A under alternatives that limit hunting to that area, it could also result in a decrease in the number of whales using the Strait of Juan de Fuca.

In addition to the Makah U&A, this analysis also focuses on the OR-SVI survey area. Calambokidis et al. (2004a) recommended using the OR-SVI as a logical and reasonable management area for considering impacts of gray whale harvests in the Makah U&A (a subset of the OR-SVI) because of the relatively high rates of interchange. About 52 percent of whales seen in the OR-SVI are also seen in the northern Washington coast/Strait of Juan de Fuca survey areas, compared to about 35 percent of whales seen in the PCFG also being seen in the northern Washington coast/Strait of Juan de Fuca survey areas (Calambokidis et al. 2014) (Subsection 3.4.3.4.1, PCFG Population Structure).

There are at least two different ways to think about the number of whales using the Makah U&A and OR-SVI survey areas during the summer feeding period: 1) the total number of animals in a single summer feeding period of June through November (which includes PCFG and non-PCFG whales), and 2) the number of animals that regularly use the area during the summer feeding period (PCFG whales). The first analysis would emphasize the role whales play in the area (for aesthetic, economic, marine habitat, or other values) and how changes in the total number of whales might affect that role. The second analysis would emphasize the whales as a group and the effects of alternative actions on the numbers in that group.[11] For either analysis, a quantitative approach is only possible using the number of identified whales. As described in Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements, it is almost certain that more whales are present in any year than are photographed and identified. Because the number of whales identified is a minimum estimate of the number present, using it overestimates impacts, which is appropriate for a conservative analysis intended to inform decision-makers of the potential effects on the environment of alternative actions. For additional context, we also compare the likely number of whales killed under each alternative to the most recent minimum abundance estimate for the OR-SVI survey region (Calambokidis et al. 2014). Although these researchers also calculated an abundance estimate for the Makah U&A survey region, they cautioned against doing so based on its small size and sighting data that demonstrates most whales disperse across a much larger area (Subsection 3.4.3.4.3, PCFG Abundance and Trends, Estimating Numbers of Whales for Subregions Within the PCFG Range).

This portion of the analysis considers change in numbers of gray whales in these local survey areas that might result if PCFG whales are killed during hunting (either harvested or struck and lost). Additional stress-related mortalities resulting from pursuit or unsuccessful harpoon attempts are possible (Subsection 4.4.2.1, Change in Abundance and Viability of the ENP Gray Whale Stock), but no information is available or could reasonably be obtained that would support an estimate of stress-related mortality of PCFG whales. It is also possible that animals could reduce their usage of or stop using an area because of the disturbance associated with a hunt. Subsection 4.1, Introduction, describes both the maximum and the likely number of PCFG, OR-SVI, and Makah U&A whales that could be killed under each alternative from a combination of being harvested or struck and lost. That information is summarized in Table 4-13.

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[11] A further layer of detail in the first analysis would be to estimate a total number of "whale days," because some whales may spend more time in a given area. A further layer of detail in the second analysis would be to assign some type of weighting based on the "value" a whale has to the group depending on how many years it had visited an area or how much time it had spent in a particular area. In both cases, the survey data are not sufficiently detailed or complete to support such estimates. Even with additional survey effort, the required level of detail and completeness would be nearly impossible to obtain given the whales' mobility, the expansiveness of the area, and practical limitations on the surveyors' viewing range and timing (e.g., lack of nighttime surveys).

Table 4-13. Number of PCFG, OR-SVI, and Makah U&A whales that may be killed under each alternative (maximum and likely).

Alternatives	No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
		Annual/Six-Year	Annual/Six-Year	Annual/Six-Year	Annual/Six-Year	Annual/Six-Year
PCFG Whales						
Maximum	0	5[a]/25	3[b]/18	1[c]/6	1/3[d]	3.5/21
Likely*	0	2.8/17	1.2/7	1/6	0.2/1	1.4/9
OR-SVI Whales						
Maximum	0	5/25	3/18	1/6	1/3	3.5/21
Likely*	0	2.6/16	1.1/7	1/6	0.18/1	1.3/8
Makah U&A Whales						
Maximum	0	6/36	3/18	1/6	1/3	3.5/21
Likely*	0	2.3/14	1.0/6	1/6	0.16/1	1.2/7

[a] This would happen if two PCFG whales were struck and lost (under Alternative 2 they would not be counted against the harvest limit) before three PCFG whales were landed and identified.
[b] Based on current estimates and assumes that at least one of the three whales is struck and lost.
[c] Only male PCFG whales can be approached under this alternative. Theoretically, a maximum of seven whales could potentially be killed under this alternative, but this would require the PCFG abundance to more than triple, which is highly unlikely.
[d] Based on current estimates and assumes that all three whales are struck and lost and subsequently die.
* These numbers represent an estimate based on proportional presence in early season photo-identification data reviewed by Calambokidis et al. (2014) and on an assumption of number of whales struck each year (see Tables 4-4, 4-6, 4-8, 4-10, and 4-12). Six-year estimates are rounded to the nearest whole number.

In addition, Subsection 3.4.3.4.3, PCFG Abundance and Trends, and Tables 3-8 through 3-10, describe gray whale use of PCFG survey areas—including the OR-SVI and Makah U&A—during the summer feeding period. These tables also show the numbers of new whales that visit the OR-SVI and Makah U&A survey areas each year, and how many of those returned in subsequent years. Also, as reflected in the increasing trends in sightings/discovery curves of unique whales (Figures 3-12 and 3-13), new whales are consistently sighted and recruited in each of the survey regions. All of these data are considered in our analysis of each alternative.

In any given year in which a harvest occurred under Alternatives 2 through 6, the total number of gray whales present during the summer in the Makah U&A and OR-SVI survey areas would be at least temporarily reduced by the number of whales killed (either harvested or struck and lost) that would otherwise have spent all or part of the summer in these survey areas. The abundance of PCFG whales would also be at least temporarily reduced by the number of such whales killed. It is possible that a killed PCFG whale that would otherwise have spent all or part of the summer in the Makah U&A or OR-SVI areas (whether returning or not) could be replaced during the same year by a whale from outside those areas, as many whales feeding during the summer throughout the PCFG range move great distances among survey areas, likely attracted by the presence of prey (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements). During the course of the summer feeding period, it is therefore possible that whales from outside the Makah U&A or the OR-SVI survey areas (e.g., from west Vancouver Island or northern California) would be traveling through these areas and stay to feed on available prey. Whether replacement would occur in the same year would depend on the number of whales removed, the availability of prey within the local survey areas relative to its availability in outside areas, and the opportunity for whales from outside the area to discover an unexploited source of prey. As a matter of probabilities, the smaller the number of whales removed, the greater the chance a removed whale would be randomly replaced by a new whale in the same year. Thus, alternatives with lower rates of removal are likely to have less effect on total numbers of PCFG whales in the Makah U&A or OR-SVI survey areas during the year in which hunting occurs.

Over time, an ongoing hunt could reduce the numbers of whales in the Makah U&A and the OR-SVI survey areas, compared to the No-action Alternative. The extent of this reduction over time would depend on the number of PCFG whales killed and the rate at which new recruits would replace killed whales, as discussed above in Subsection 4.4.2.3, Change in Abundance and Viability of PCFG Whales. Although it is not possible to predict the potential decrease in numbers of whales, it is reasonable to expect that the fewer the number of whales removed, the less the decrease. Regardless of whether hunting occurs, gray whale numbers in the Makah U&A or OR-SVI survey areas during the summer feeding period can be expected to fluctuate over time as prey availability fluctuates in these areas relative to other feeding areas.

The number of whales in the Makah U&A or OR-SVI survey areas could also be affected if gray whales changed their distribution and habitat use in response to a tribal hunt under the action alternatives. Responses could include changes in the distance from shore that whales travel during migration, changes in the amount of time spent by whales while in the Makah U&A or OR-SVI, or changes in the approachability of whales. Gray whales being pursued by whale-watching vessels have been observed to change course and alter swimming speed and respiratory patterns temporarily (Subsection 3.4.3.6.6, Vessel Interactions). Studies of whale-watching activities in the lagoons of Baja California documented that gray whales were less likely to flee as the season progressed (Subsection 3.4.3.6.5, Offshore Activities and Underwater Noise). It is reasonable to expect that whales approached by Makah whale-hunting vessels would react temporarily in a similar manner. It is uncertain what the long-term effects would be on whales exposed to repeated approaches. The studies of whale-watching activities suggest the whales might become habituated and have less of a reaction the more frequently they are approached. It is uncertain how whales would react to unsuccessful harpoon attempts, but the reaction may be similar to that observed in whales that are tagged or biopsied. Such reactions are likely to be dramatic (e.g., fluke slapping and rapid swimming) but temporary changes in behavior (Subsection 3.4.3.6.6, Vessel Interactions). Whales may be less likely to habituate to unsuccessful harpoon attempts than to approaches of vessels. It is unknown whether whales in the vicinity of successful harpoon attempts will develop an association between vessel approaches and harpoon strikes such that they begin to avoid vessels.

During migration, it is uncertain what factors affect gray whale distribution and habitat use. While there is evidence that gray whales will alter course or swimming speed in response to disturbances, there is no evidence that the alteration is more than temporary (Subsection 3.4.3.6, Known and Potential Anthropogenic Impacts). Clarke and Moore (2002) found there was little evidence that gray whales disturbed by human activities travel far in response to disturbances or remain disturbed for long.

During feeding, the factor most strongly affecting gray whale distribution and habitat use is likely the availability of prey. Darling et al. (1998) and Moore et al. (2007) document abandonment of feeding areas and establishment of new feeding areas linked to natural variation in prey availability. Feeding gray whales change location and habitat to exploit the optimum prey species at any one time, based on abundance, density, size, caloric content, and predation pressure. Such factors may vary by season and year, depending on environmental variability and the population dynamics of prey (Subsection 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem).

Gray whales using the PCFG portion of the summer range tend to move up and down the coast during the feeding period, presumably searching for prey. Some whales remain in local survey areas for weeks or months, while others may be present only for brief periods (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements). It is possible that a hunt and associated activities in the Makah U&A might disturb whales, causing them to move elsewhere in search of feeding opportunities away from these activities. The severity of this effect would depend, in part, on the extent of the disturbance. Thus, alternatives that result in more whales approached or subjected to harpoon attempts, or result in more days of hunting, are likely to cause more disturbance of feeding gray whales. The severity of the effect would also depend, in part, on the sensitivity of gray whales to disturbance in feeding areas. Available information indicates that feeding gray whales may not abandon feeding areas because of hunt-related disturbance. For example, the pursuit of gray whales during the aboriginal hunt in the Chukotkan region of Russia does not appear to have diminished the opportunity for that subsistence hunt, as it has been ongoing for years. This indicates that, at least in one part of their summer range, gray whales have not abandoned areas where they have been subjected to many years of hunting.

Some disturbance-related information is available for gray whales in the Makah U&A and elsewhere in the PCFG region, mostly during the spring migration period. In 1999, Makah whaling crews hunted for up to 11 hours per day on 4 days between May 10 and17, and actively pursued gray whales (including harpoon throws) at various locations on 3 days. In addition, aircraft and a number of protest vessels were active near the hunters and two of these vessels were observed to come in contact with gray whales: one ran over the top of a whale and temporarily stunned it, and another vessel hit the flukes of a diving whale. In 2000, Makah crews hunted an average of 7 hours per day on 7 days between April 17 and May 29. During that time, hunters encountered an estimated 58 whales and made three harpoon throws, one of which may have grazed an animal. Aircraft and protest vessels were also active during the 2000 hunt. Despite this activity, gray whales continued to be sighted in the Makah U&A, OR-SVI, and PCFG survey areas during and after hunting had stopped in 1999 and 2000 (as well as the following year, 2001), including several PCFG whales that were sighted in the Makah U&A during consecutive years and one that was sighted there during all 3 years (J. Laake, pers. comm., NOAA Fisheries Statistician, March 11, 2014).

More recently, during the unauthorized hunt in September 2007 (i.e., during the summer feeding period), the Makah Tribe's biologist reported on the distribution and behavior of gray whales in the vicinity of the whale that had been harpooned, shot, and eventually killed in the Strait of Juan de Fuca (Subsection 3.4.3.5.2, Whale Response to Being Pursued). Anecdotal reports noted that other gray whales could be seen spouting in the area during the hunt and seemed unaffected by the hunt and Coast Guard and fishing boats in the area. Three days after the hunt the biologist sighted two gray whales within 0.6 miles (1 km) of where the killed whale had been harpooned, and noted that these whales exhibited "normal feeding behaviors and showed no escape behavior or agitation when approached by the vessel for photographs." While it is not possible to say how many whales would have been present without these hunt-related disturbances, taken together, these more recent reports since 1999 suggest that gray whales would not abandon the Makah U&A or other areas in the PCFG range as a result of limited hunt-related activity (e.g., compared to that of the Chukotkan gray whale hunt).

Concerns about whales avoiding or abandoning the Makah U&A as a result of hunt-related activity could be addressed by continued monitoring aimed at detecting changes in whale distribution and habitat use, although it would be difficult to detect trends in whale presence, and changes in distribution would more likely be related to changes in prey distribution rather than hunt-related activity. Other options to address this concern include setting limits on the numbers of whales that could be approached or subjected to strike attempts or reducing the number of whales that may be struck and lost.

4.4.2.5 Welfare of Individual Whales - Method of Striking and Killing; Time to Death; Hunting Efficiency

The Tribe proposes to hunt gray whales using a toggle-point harpoon to strike and secure whales and a .50 caliber rifle to kill those that have been struck and secured. The Tribe also proposes a number of measures to contribute to the safety and efficiency of the hunt, including a minimum distance from a whale before firing; minimum visibility conditions under which a weapon may be fired; motorized chase vessels to pursue whales, to provide a shooting platform, and to tow killed whales to shore; and training for hunters. In addition to the Tribe's proposed hunting weapons, this analysis considers the option of using explosive projectiles to strike and kill gray whales, either attached to a hand-thrown harpoon or delivered by a shoulder gun. These techniques have been used in the Chukotka Native gray whale hunt. Explosive projectiles may contain black powder or penthrite. The Proposed Hunting Method portion of Subsection 2.3.2.2., Gray Whale Hunt Details, describes these hunting weapons, either of which may be used with any of the action alternatives (Alternatives 2 through 6).

This analysis examines the manner of death and the time to death of individual whales using either of two different general hunting methods: 1) a toggle-point harpoon for striking whales and a .50 or .577 caliber rifle for killing whales, or 2) an explosive projectile for both striking and killing whales, delivered either using a hand-thrown darting gun (a striking weapon that attaches a line and floats to the whale) or a shoulder gun (a killing weapon that does not secure the whale and is not used until the whale is secured by a hand-thrown harpoon or darting gun). It also examines the potential for individual whales to be struck and lost, compared to whales struck and successfully landed (referred to as hunting efficiency). The more efficient the hunt, the greater the likelihood that fewer whales would be struck and lost in reaching the hunting quota, thus limiting impacts to fewer individual whales. Also, more efficient hunts could reduce the number of encounters with whales exhibiting aggressive behavior (i.e., as in the Chukotkan hunts, Subsection 3.4.3.5.3 Whale Response to Being Struck).

For Alternatives 2, 4, 5, and 6, in addition to the weapons described above, the Tribe would use a 30-foot (9.1-m) wooden canoe to transport and position the harpooner. For Alternative 3, the harpooner would most likely be transported and positioned using a motorized vessel. For the reasons described in Subsection 4.1.3.4, Potential Number of Unsuccessful Harpoon Attempts and Approaches, this analysis assumes that a hunt under Alternative 3 using all motorized vessels would be about as efficient as a hunt using a canoe to position the harpooner. This section does not focus on the welfare of individual whales (refer to Subsection 3.4.3.5, Welfare of Individual Whales) that would be the target of pursuit or unsuccessful harpoon attempts. Welfare effects on those whales are considered at the scale of the ENP gray whale stock and of whales that use local survey areas (Subsection 4.4.2.1, Change in Abundance and Viability of the ENP Gray Whale Stock, and Subsection 4.4.2.4, Change in Numbers of Gray

Whales in the Makah U&A and OR-SVI Areas). This section does, however, consider whether approaches by Makah hunting vessels and unsuccessful harpoon attempts would affect gray whale distribution and habitat use.

4.4.2.5.1 Method of Striking and Killing, Time to Death

A toggle-point harpoon penetrates the epidermis and blubber of the whale and toggles open to secure the whale. The area of trauma is the area penetrated by the harpoon. There is evidence that a harpoon strike causes pain as whales may respond to being struck by diving, thrashing, or ramming a boat (Subsection 3.4.3.5.3, Whale Response to Being Struck). Following the harpoon strike that secures the whale, the whale is shot with bullets targeted at the brain or central nervous system to cause death by penetrating and damaging the brain or central nervous system. Like the harpoon strike, a bullet causes trauma in the area of penetration. Time to death for the whale killed with a .577 caliber bullet in the Makah hunt in 1999 was 8 minutes from the time the whale was struck with the harpoon until it was rendered insensible from the second of two rifle shots. Time to death for the whale killed in the unauthorized hunt in 2007 was 11 hours from the time the whale was struck (or the first shot was fired) until the whale apparently died and sank. In the 2008 Chukotka Native hunt, the Russian Federation reported that the maximum number of shots per gray whale killed (120 animals) was 140 and the mean and maximum time to death was 31 minutes and 95 minutes, respectively. It is reasonable to expect that average time to death in a Makah hunt using a .50 or .577 caliber rifle as the killing weapon would be shorter than average time to death in the Chukotka Native hunt because the Makah Tribe would use a higher caliber rifle, which would kill a gray whale more effectively than a lower caliber rifle used by the Chukotka Native hunters (Subsection 3.4.3.5.4, Method of Killing and Time to Death). It is also possible that other requirements of the Makah hunt (minimum visibility conditions, minimum shooting distance, use of a look-out, and training) would result in a shorter time to death than documented in the Chukotka Native hunt.

It is difficult to compare the time to death of the whale during the unauthorized Makah gray whale hunt in 2007 to expected time to death in a future authorized hunt. During the 2007 hunt, many of the procedures proposed by the Makah were not followed (such as training of the shooter) (Subsection 3.15.2.2, Weapon Safety Regulations and Authorities). In addition, the at-sea intervention of the Coast Guard and NOAA's subsequent deliberation regarding what action to take with the wounded whale prevented the tribal members or tribal authorities from taking further action to kill the whale more expeditiously. In addition, it is not known what ammunition the unauthorized hunters used or the number of times that each rifle was fired. The Makah marine mammal biologist reported that the hunters were in possession of both a .460 and a .577 caliber rifle, and that four harpoons were embedded in the whale and 16 bullet wounds were observed. The experience of the 2007 unauthorized hunt emphasizes the importance of adopting and enforcing procedures governing the safety and humaneness of the hunt, in the event a hunt is authorized.

Concerns about time to death for individual whales, particularly in light of the unauthorized Makah hunt in September 2007, could be addressed by improved enforcement of the regulations proposed by the Makah to govern a hunt, including training of riflemen and other members of the whaling crew, maintenance and control of weapons and ammunition, and requirements for a chase boat with a lookout. It is uncertain whether use of an explosive projectile could reduce time to death. Other options for reducing time to death include improved enforcement of the moving exclusionary zone (MEZ) so protest vessels do not disrupt the hunt and allowing a hunt during better weather conditions (Alternative 4).

The alternative method of striking and killing whales is the use of explosive projectiles, delivered either by a hand-thrown darting gun or a shoulder gun (Subsection 3.4.3.5.4, Method of Killing and Time to Death, Explosive Grenade as the Killing Weapon). Explosive projectiles cause more extensive trauma at the site of penetration than a harpoon or bullet and can cause trauma at a farther distance from the site of penetration. Unlike a toggle-point harpoon, which would not kill a whale immediately, an explosive projectile used for striking a whale may result in instantaneous or nearly instantaneous insensibility or death. In 2006, for whales killed using a darting gun with a black powder explosive projectile, Chukotka Native hunters reported an average time to death of 32 minutes for 88 whales (minimum 3 minutes, maximum 3 hours). In the 2002 season, the average time to death was also 32 minutes (maximum of 56 minutes) and hunters used an average of 2.7 darting gun projectiles per whale killed; this ratio has remained relatively stable during the past decade. In field trials with penthrite grenades in the Alaska bowhead hunt, time to death was on average 50 percent of the time to death using black powder grenades. It is uncertain what the average time to death would be for gray whales killed in a Makah gray whale hunt using explosive projectiles as the striking and killing weapon, though it is possible that average time to death would be lower than with the alternative method (toggle-point harpoon and rifle), because the striking weapon has the potential to quickly kill the whale or render it insensible.

4.4.2.5.2 Timing of Hunt and Time to Death

Regardless of the method selected, whales killed under Alternative 4 (i.e., a summer/fall hunt scenario) might experience the shortest time to death. This is because the other action alternatives could include hunting during winter and spring months when weather and sea conditions are less favorable, which might hamper the accuracy of hunters using harpoons, rifles, or explosive projectiles. Less accurate weapon strikes would likely increase the time to death (Subsection 3.4.3.5.4, Method of Killing and Time to Death). Also, under Alternative 4, it is likely that pursued whales would exhibit feeding behaviors (e.g., milling in a localized area and shorter dive times) that might allow hunters to better position themselves for more accurate weapon strikes. The other action alternatives do allow for hunting in May when ocean conditions are also relatively good. However, there is also a greater chance that hunters would encounter actively migrating whales during this time, likely making them more difficult to intercept and strike with high accuracy.

4.4.2.5.3 Hunting Efficiency

Of the more than 1,100 whales harvested by Chukotkan hunters during the period 2003 to 2011, less than 3 percent have been struck and lost (averaging 2.3 percent per year) (i.e., a hunt efficiency rate of over 97 percent). The Russian Federation reported that Chukotka Native hunters experienced fewer whales struck and lost when explosive projectiles were used. Given the lack of experience with a Makah gray whale hunt, it is not possible to predict the proportion of whales likely to be struck and lost under any of the alternatives, nor is it possible to predict the relative proportion of struck-and-lost whales using the alternative hunting methods. The Makah proposal (Alternative 2) would allow for 18 whales struck and lost over 6 years and 24 harvested (24 out of 42 whales equals a 57 percent efficiency rate). For purposes of analyzing impacts on gray whales, NMFS assumes that the Tribe would each year reach the maximum limits on whales that could be struck (based on current conditions and estimates). For each action alternative the limits are as follows:

- **Alternative 2**: seven strikes per year, of which at most three can be struck and lost, and at most four on average can be harvested. Efficiency rate = 57 percent (assuming four whales harvested out of seven strikes).
- **Alternative 3**: six strikes per year, of which at most two can be struck and lost, and at most four on average can be harvested. Efficiency rate = 67 percent (assuming four whales harvested out of six strikes).
- **Alternative 4**: one strike per year; whale is either struck and lost or harvested. Efficiency rate = 100 percent (assuming a struck whale is harvested).[12]

[12] As noted in the text, under current conditions we assume there would be one strike per year. While in theory, there could be up to seven strikes per year under this alternative, that is extremely unlikely given that the minimum population estimate for PCFG whales would need to more than triple while other variables (such as Rmax and the recovery factor) remained the same.

- **Alternative 5**: five strikes per year, of which at most one can be struck and lost, and at most four on average can be harvested. Efficiency rate = 80 percent (assuming four whales harvested out of five strikes).
- **Alternative 6**: four strikes per year, of which at most four can be struck and lost, and at most four on average can be harvested. Efficiency rate = 100 percent (assuming all struck whales are harvested).

Concerns about hunting efficiency could be addressed by decreasing the allowable numbers of whales struck and lost in a Makah hunt. Concerns could also be addressed by allowing hunting during more favorable weather conditions, which might improve the accuracy of hunters using harpoons, rifles, or explosive projectiles. More accurate weapon strikes might result in fewer whales struck and lost and thus a higher efficiency rate. In addition, better weather conditions would make it easier to land a killed whale, potentially decreasing the proportion of struck and lost whales.

4.4.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to affect 1) a change in abundance and viability of the ENP gray whale stock, 2) a change in abundance and viability of the WNP gray whale stock, 3) a change in abundance and viability of PCFG whales, 4) a change in numbers of gray whales in the Makah U&A and OR-SVI survey areas, and 5) the welfare of individual whales. The various alternatives incorporate mitigation measures (e.g., hunt timing and harvest limits) and we have highlighted additional mitigation considerations, as appropriate, in our analysis.

The risk of adverse effects on the abundance of the ENP gray whale stock as a whole would be the same under any of the alternatives, including the No-action Alternative. This is because the IWC catch limit remains the same under all alternatives, and it is reasonable to expect that the United States would transfer, and the Chukotka Natives would harvest, any unused Makah share of the catch limit. The result would be that the same total number of whales would likely be removed from the stock by hunting. The difference between the No-action Alternative and the action alternatives is that under the action alternatives, some of that harvest would take place by Makah hunters in the coastal portion of the Makah U&A. Thus, none of the action alternatives would likely affect the abundance of the ENP gray whale stock as a whole, compared to the No-action Alternative.

If the United States did not transfer any unused portion of the catch limit to Russia, Alternative 1 would result in the least impact to the ENP gray whale stock as a whole at least through 2018, because only the annual average of 120 whales allocated to Russia would be harvested. Of the action alternatives, under current conditions, Alternative 4 (in which the Makah Tribe would be limited to one struck whale) would result in less impact than Alternatives 2, 3, 5, and 6, (in which the Tribe could strike four to seven whales per year and land up to four whales on average per year).

Subsection 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales, summarizes the available information pertaining to PCFG whales and the basis for NMFS' conclusion that the PCFG seems to be a distinct feeding aggregation and may warrant consideration as a distinct stock in the future (Carretta et al. 2014). If PCFG whales are uniquely adapted to exploit feeding areas in the southern portion of the ENP summer range, and any of the action alternatives compromised the viability of the PCFG, there could be an effect on the long-term viability of the ENP stock as a whole (Subsection 4.4.2.1, Change in Abundance and Viability of the ENP Gray Whale Stock). However, given that the entire herd migrates through the PCFG range twice each year, and given the evidence that individual whales vary their use of feeding areas inside and outside of this range, both across years and within years, it is likely that whales would continue to discover and use the PCFG feeding areas, even if an action alternative had an adverse effect on the abundance of PCFG whales. This concern could be mitigated by managing a hunt to avoid adversely affecting the viability of PCFG whales.

The risk of adverse effects on the WNP gray whale stock would be lowest under the No-action Alternative (no hunting) and Alternative 4, which is designed to avoid WNP whales by limiting hunting to the summer and fall months when WNP whales would be feeding off Sakhalin Island. The remaining action alternatives have a low probability (0.04 to 0.07) (refer to Tables 4-4, 4-6, 4-8, 4-10, and 4-12) of Makah hunters striking at least one WNP whale in 6 years.

The lowest risk to the numbers of gray whales in the Makah U&A and OR-SVI survey areas would occur under the No-action Alternative, under which no Makah whale hunts would be authorized. It is unlikely that PCFG whales and OR-SVI whales would be present in the area of the Chukotka hunt and thus killed under the No-action Alternative. In contrast, the risks to whales in the PCFG range would be higher under the action alternatives because of the likelihood that some PCFG whales (including Makah U&A whales and OR-SVI whales) would likely be killed in a Makah hunt. For each action alternative, the maximum and likely numbers of PCFG whales that might be killed in a year (based on current estimates) are as follows (from Table 4-1):

- **Alternative 2**: 5 PCFG whales maximum, 2.8 whales likely
- **Alternative 3**: 3 PCFG whales maximum, 1.2 whales likely
- **Alternative 4**: 1 PCFG whale maximum, 1 whale likely
- **Alternative 5**: 1 PCFG whale maximum, 1 whale every 5 years likely (0.20/year)
- **Alternative 6**: 3.5 PCFG whales maximum, 1.4 whales likely

4.4.3.1 Alternative 1, No Action

Under the No-action Alternative, we would not allocate a gray whale quota to the Makah Tribe and no authorized hunting by the Tribe would occur. As described in Subsection 4.1, Introduction, the current annual and 6-year IWC catch limits set for ENP gray whales are based on a joint request of the Russian Federation (for Chukotka Natives) and the United States (for the Makah Tribe). Because the United States would likely transfer any unused share of the catch limit to Russia, the number of gray whales that may be landed from the ENP stock during the 6-year period from 2013 through 2018 would be the same under Alternative 1 as under current conditions (744 whales over 6 years, with no more than 140 whales taken in any one year). Thus, the effects on the abundance and viability of the ENP gray whale stock would not differ from the current conditions described in Subsection 3.4.3.3, Eastern North Pacific (ENP) Gray Whales.

Similarly, under the No-action Alternative, any stress-related mortality of ENP gray whales would be the same as under current conditions, in which the Chukotkans harvest the entire IWC catch limit. If the United States did not transfer its unused share of the catch limit for the 4 years remaining in the catch limit (2015 to 2018), there would be 28 fewer whales struck under Alternative 1 than under current conditions. That difference in stress-related mortality that would result from the reduced number of strikes is unlikely to have any effect on the abundance and viability of the ENP gray whale stock because 28 whales are a tiny fraction (0.1 percent) of the 20,990 animals in this stock (which has been stable in recent years following a 3.2 percent increase per year from the 1960s to 1980s).

Under the No-action Alternative, the health, abundance, and habitat conditions for WNP and ENP stocks of gray whales (including PCFG whales and summer feeding whales in the Makah U&A and OR-SVI survey areas) would remain as under current conditions. Domestic prohibitions on gray whale take pursuant to section 101 of the MMPA would continue, and take would require authorization from NMFS, subject to public review. Factors that could cause a change in distribution or habitat use, such as variability in prey abundance from environmental perturbation, vessel traffic and noise, or commercial fisheries, would similarly be expected to remain at present levels.

4.4.3.2 Alternative 2, Tribe's Proposed Action

Under Alternative 2, whale hunting may occur from December 1 through May 31 in the coastal portion of the Makah U&A. Annually, an average of four whales could be harvested by the Makah Tribe, a maximum of seven could be struck, and a maximum of three could be struck and lost. During any 6-year period, up to 24 whales might be harvested, with 42 struck and 18 struck and lost. As many as 353 whales may be approached by whale hunting vessels in any one year and up to 42 whales may be exposed to unsuccessful harpoon attempts. With up to four whales likely being harvested each year, there could be up to 64 rifle shots fired or 12 grenade explosions per year. While it is possible that the Tribe could hunt on 43 days between December and May, inclement weather conditions might practically limit hunting to a total of 33 days during March through May. Given the limited number of likely hunting days available under Alternative 2, the Tribe might not be able to harvest the full number of whales allowed.

4.4.3.2.1 Change in Abundance and Viability of the ENP Gray Whale Stock

The potential direct and indirect mortality resulting from the whale hunt and hunt-related activities under Alternative 2 would be unlikely to change ENP gray whale stock abundance or viability compared to the No-action Alternative. As noted in Subsection 4.1, Introduction, the catch limit for the ENP gray whale stock set by the IWC would not change under this or any of the other alternatives; thus, the same number of ENP gray whales would likely be harvested over 6 years under Alternative 2 as under the No-action Alternative. If, over 6 years, Makah hunts for 24 whales resulted in a higher level of stress-related mortality than would occur if those 24 whales were harvested in a Chukotkan hunt under the No-action Alternative, the difference is unlikely to have an appreciable effect on the abundance and viability of the ENP gray whale stock as a whole. This is because the stress-related mortality associated with harvesting 24 whales over 6 years is likely to be minor in the context of the existing Chukotkan harvest level of 720 whales over 6 years.

If under the No-action Alternative the United States did not transfer unused portions of the catch limit to Russia, Alternative 2 would represent an increase in mortality of at most 28 gray whales over the 4 remaining years of the catch limit (2015 through 2018) (seven struck whales per year times 4 years), compared to the No-action Alternative. Because 28 whales are a tiny fraction of the overall ENP gray whale stock (0.1 percent), which has been stable over the past decade, the increase in mortalities under Alternative 2 would be extremely unlikely to affect gray whale viability, compared to the No-action Alternative.

If PCFG whales are uniquely adapted to exploit feeding areas in the southern portion of the ENP summer range, and that adaptation were lost if the PCFG were compromised, Alternative 2 has the potential to affect the long-term viability of the ENP stock as a whole. However, as described in Subsection 4.4.3.2.3, Change in Abundance and Viability of PCFG Whales, the best available information indicates that the PCFG would still be viable with a hunt under Alternative 2, so there is no reason to believe that this alternative would affect the ENP stock as a whole.

4.4.3.2.2 Change in Abundance and Viability of the WNP Gray Whale Stock

Available sighting data suggest that WNP whales could be encountered in the vicinity of the Makah U&A (Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements) during much of the hunting season under Alternative 2, perhaps with the exception of early May to late December. Modeling based on Moore and Weller (2013) estimated that there was a very high chance (over 97 percent) that during a 6-year period a WNP whale would be approached by Makah hunters under Alternative 2. The chance of an attempted strike on at least one WNP whale in 6 years was 35 percent, while the chance of actually striking at least one WNP whale in 6 years was 7 percent) (median estimates) (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014). These estimates represent an increased risk to these whales compared to the No-action Alternative.

It is uncertain how whales would react to unsuccessful harpoon attempts, but the reaction may be similar to that observed in whales that are tagged or biopsied (i.e., a dramatic but temporary change in behavior).

While the chances of killing a WNP whale are low, even over a 6-year period, the loss of WNP whales, particularly reproductive females, from this small stock could be a conservation concern depending on the number lost and the time period over which such losses occurred. To mitigate for the possibility of a Makah hunt killing a WNP whale, regulations governing a hunt could require a suspension of the hunt if a WNP whale were killed. Procedures for photographing any whale that is landed would make it likely a WNP whale would be identified if it were landed. If a WNP whale were struck and lost, it is possible, though not certain, it could be identified.

4.4.3.2.3 Change in Abundance and Viability of PCFG Whales

Compared to the No-action Alternative, Alternative 2 could reduce the abundance of PCFG gray whales, which could in turn affect the viability of the PCFG.

As described in Subsection 4.1.2, Alternative 2 and Table 4-1, the current maximum number of PCFG whales that could be killed under Alternative 2 would be 5 per year. However, it is more likely that an average of 2.8 PCFG whales per year might actually be killed (and 17 whales over 6 years) given the high proportion of non-PCFG whales present in the Makah U&A during the spring portion of the hunting season when the Tribe is most likely to hunt.

If 2.8 PCFG whales were killed it would represent a 1.3 percent reduction in the current abundance estimate of 209 PCFG whales (Calambokidis et al. 2014). Compared to the No-action Alternative, this would represent a small decrease in abundance during the year in which PCFG whales were removed. Over time, it is uncertain to what extent the death of 2.8 PCFG whales per year might decrease the abundance of the PCFG. During the years 1999 to 2011 there were 14.3 new recruits on average, 12.5 (87 percent) of which were not identified as calves (Subsection 3.4.3.4.1, PCFG Population Structure).

At the current rate of recruitment, the PCFG abundance trend appears to be flat. It is possible external recruits could increase, compared to the No-action Alternative, as a result of the removal of 2.8 PCFG whales, in which case the abundance of the PCFG could remain at its current level.

In contrast to the No-action Alternative, Alternative 2 could reduce the likelihood of the PCFG being viable into the future by reducing the numbers of PCFG whales. An analysis by the IWC Scientific Committee suggests the PCFG would nevertheless remain viable with a hunt under Alternative 2. As described in Subsection 4.4.2.3, Change in Abundance and Viability of PCFG Whales, the IWC's Scientific Committee recently evaluated the Makah hunt proposal (Alternative 2) via models that use a 100-year time horizon. That committee's conclusion indicates that the PCFG would be viable as long as the hunt included a bycatch formula to limit the strikes on PCFG whales and annual monitoring was conducted to assess the availability of PCFG whales in the Makah hunt. The committee's modeling used a bycatch formula that, under current population parameters, yields a bycatch limit of 3.0 PCFG whales per year. That value is slightly greater than the number of PCFG whales likely to be killed under Alternative 2 (i.e., 2.8 whales per year), which uses the same bycatch formula as the IWC analysis, indicating that the PCFG would still be viable with a hunt under Alternative 2. If the requisite monitoring indicated a higher availability of PCFG whales then the IWC would likely reassess its conclusions via a new implementation review (Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates, IWC Implementation Review of PCFG Gray Whales).

During the proposed hunting season (December through May) under Alternative 2, approximately 40 percent (142 whales) of the 353 whales approached during hunt activities would be expected to be PCFG whales (Subsection 4.1.2, Alternative 2) (Table 4-4). Similarly, 17 of the 42 whales potentially subjected to harpoon attempts would be expected to be PCFG whales. It is unknown whether this level of disturbance would cause PCFG whales to change their distribution (i.e., avoid the hunt area). Some aspects of approaches by Makah whale-hunting canoes would cause a disturbance similar to that observed from approaches of motorized whale-watching vessels or vessels used for photo identification work. It is known that when approached by vessels some gray whales exhibit temporary behavioral responses, such as changing course, swimming speed, and respiratory patterns (Subsection 3.4.3.6.6, Vessel Interactions). However, there is no evidence that gray whales have altered their distribution or habitat use in lagoons in their winter range in response to the presence of whale-watching vessels. While some researchers have suggested that gray whales may have altered their migration distance from shore in response to vessels and other human activity, other researchers concluded there is no evidence suggesting such a relationship. Thus, whale response to approaches is likely to be temporary (minutes or hours).

It is less certain whether the intensity of unsuccessful harpoon attempts would result in more than a temporary disturbance of PCFG whales and cause them to avoid portions of their range either for a short period (days to weeks) or a longer period (for example, over a period of years). As described in Subsection 3.4.3.3.2, ENP Seasonal Distribution, Migration, and Movements, the availability of prey may be the factor most strongly affecting gray whale numbers in particular feeding areas. If prey is available throughout the PCFG range, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Many new whales are seen in the PCFG range every year and there is significant interchange among survey areas within this range (Subsection 3.4.3.4.3, PCFG Abundance and Trends). Thus, even if some whales do abandon an area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area. The example of gray whales hunted by Chukotka Natives may be instructive in trying to predict whether there would be a change in gray whale use of areas within the PCFG range. Scores of whales have been hunted and killed by Chukotka Natives over several years (Table 3-52), yet whales continue to be available for harvest, suggesting that hunt-related activities have not resulted in major changes in gray whale numbers, distribution, or habitat use in that area.

If hunting in the coastal portion of the Makah U&A did cause a change in distribution, it is likely that whales would shift to using adjacent areas, especially the Strait of Juan de Fuca portion of the Makah U&A and southern Vancouver Island, because those areas already have high rates of interchange with the proposed hunt area. Also, because hunting activities under Alternative 2 would end prior to the June through November feeding period, it is possible that PCFG whales might only temporarily avoid the coastal portion of the Makah U&A given that there would be 6 consecutive months with no hunt-related activities. Thus, available information indicates that gray whale distribution and habitat use under Alternative 2 would not change appreciably compared to the No-action Alternative.

4.4.3.2.4 Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Survey Areas

Compared to the No-action Alternative, Alternative 2 would result in gray whales being hunted in the coastal portion of the Makah U&A, which is a subset of the OR-SVI survey region and situated within the migration corridor of the entire ENP herd of gray whales. Such hunting could reduce the numbers of gray whales in these areas during the summer feeding period either as a result of whales being killed or as a result of feeding whales changing their distribution during the summer feeding period.

Change in Numbers as a Result of Whales Being Killed

As described in Subsection 4.1.2, Alternative 2 and Table 4-1, the current maximum number of OR-SVI or Makah U&A whales killed would be five per year. However, it is more likely that an average of 2.6 OR-SVI whales or 2.3 Makah U&A whales might actually be killed each year (and 16 or 14 whales, respectively, over 6 years) given the presumed proportional presence of these whales in the proposed hunt area during the March through May time period when the Tribe is most likely to hunt.

It is uncertain whether OR-SVI whales or Makah U&A whales killed under Alternative 2 would be replaced in the same year in which they were killed or in subsequent years because of the uncertainty regarding the recruitment mechanism and rate of recruitment into the PCFG and the uncertainty regarding the distribution of both PCFG and non-PCFG whales in these survey areas during the summer months. (As described above in Subsection 4.4.2.4, Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Areas, whales in these survey areas during the summer months include both whales that have visited the PCFG area in more than 2 years [PCFG whales] and whales that visit only once and are never sighted again [transient, non-PCFG whales]). Calambokidis et al. (2014) have analyzed the most recent sighting data for PCFG whales. From 1996 through 2012 there have been 438 uniquely identified whales sighted in the OR-SVI area from June through November. An average of 95 whales are sighted each year, and of these an average of 24 whales are newly seen each year (ranging from 8 to 56 whales, and 28 whales for 2012). The annual average number of whales newly seen and then seen again in a subsequent year (“returning” whales) is 12 whales (ranging from 3 to 37 whales, and 3 whales for the most recent year reported). In the Makah U&A, 227 uniquely identified whales have been sighted from 1996 through 2012 in the June through November time period. An average of 33 whales are sighted each year, and of these an average of 12 whales are newly seen each year (ranging from 1 to 29 whales, and 22 whales for the most recent year reported). The annual average number of whales newly seen and then seen again in a subsequent year is 6 whales (ranging from 2 to 17 whales, and 4 whales for the most recent year reported). These sighting data, while subject to the survey limitations described in Subsection 4.4.2.3, Change in Abundance and Viability of PCFG Whales, demonstrate that many new whales are seen each year in these OR-SVI and Makah U&A areas, and of these whales, variable but large numbers are seen (or never seen) again.

Based on the annual average number of newly seen whales in the Makah U&A and OR-SVI survey areas (12 and 24 whales, respectively), it is possible that if up to two to three Makah U&A or OR-SVI whales were removed under Alternative 2, they would be replaced during that year with new Makah U&A or OR-SVI whales. In that case, Alternative 2 would not result in a decrease in the total number of gray whales using the Makah U&A and OR-SVI survey areas during a given summer feeding period, compared to the No-action Alternative.

Over time, an ongoing hunt could reduce the abundance of PCFG whales and thereby reduce the number of whales using the Makah U&A and OR-SVI areas. The extent to which a hunt would reduce abundance over time would depend on the rate at which external recruits would replace killed whales, similar to the discussion above for change in numbers of PCFG whales (Subsection 4.4.3.2.3, Change in Abundance and Viability of PCFG Whales). It seems likely that if the killed Makah U&A or OR-SVI whales were returning whales, they would be replaced in subsequent years with another returning whale, based on the average number of newly seen whales in the Makah U&A and OR-SVI survey areas that are then seen again in a subsequent year (6 and 12 whales, respectively). If for some reason new whales (that become returning whales) did not take the place of killed returning whales in subsequent years, the Tribe's allowable bycatch level would decrease over time because of the Tribe's proposal to establish limits on PCFG whales based on the annually updated estimate of returning OR-SVI whales. It is also possible that the removal of PCFG whales would result in the presence of more non-PCFG whales using the Makah U&A and OR-SVI during the summer months (i.e., whales that appear in the area in only 1 year and do not return again). This is uncertain, however, so the analysis does not assume it would occur.

Change in Numbers as a Result of Change in Distribution of Feeding Whales

During the proposed hunting season (December through May) under Alternative 2, annually about 117 whales approached during hunt activities would be expected to be Makah U&A whales, while 131 would be expected to be OR-SVI whales (Subsection 4.1.2, Alternative 2) (Table 4-4). Thus, of the 353 whales potentially approached, approximately 33 percent (on average) would be Makah U&A whales and 37 percent would be OR-SVI whales. Of the 42 whales potentially subjected to harpoon attempts, 14 would be expected to be Makah U&A whales and 16 would be expected to be OR-SVI whales. It is unknown whether this level of disturbance would cause whales to change their distribution (i.e., avoid the hunt area).

Some aspects of approaches by Makah whale-hunting canoes would cause a disturbance similar to that observed from approaches of motorized whale-watching vessels or vessels used for photo identification work. It is known that when approached by vessels some gray whales exhibit temporary behavioral responses, such as changing course, swimming speed, and respiratory patterns (Subsection 3.4.3.6.6, Vessel Interactions). However, there is no evidence that gray whales have altered their distribution or habitat use in lagoons in their winter range in response to the presence of whale-watching vessels. While some researchers have suggested that gray whales may have altered their migration distance from shore in response to vessels and other human activity, other researchers concluded there is no evidence suggesting such a relationship. Thus, whale response to approaches is likely to be temporary (minutes or hours).

It is less certain whether the intensity of unsuccessful harpoon attempts would result in more than a temporary disturbance of Makah U&A or OR-SVI whales and cause them to avoid portions of the

Makah U&A or OR-SVI either for a short period (days to weeks) or a longer period (for example, over a period of years). As described in Subsection 3.4.3.3.1, ENP Seasonal Distribution, Migration, and Movements, the availability of prey may be the factor most strongly affecting gray whale numbers in particular feeding areas. If prey is available in the Makah U&A or OR-SVI, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Many new whales are seen in the Makah U&A and OR-SVI every year and there is significant interchange with whales from other adjacent areas in the PCFG range (Subsection 3.4.3.4.3, PCFG Abundance and Trends). Thus, even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area. The example of gray whales hunted by Chukotka Natives may be instructive in trying to predict whether there would be a change in gray whale use of the Makah U&A and OR-SVI survey areas. Scores of whales have been hunted and killed by Chukotka Natives over several years (Table 3-52), yet whales continue to be available for harvest, suggesting that hunt-related activities have not resulted in major changes in gray whale numbers, distribution, or habitat use in that area.

Spatially, the OR-SVI area is a relatively small part (approximately 11 percent) of the entire PCFG range, but the area attracts a disproportionately high percentage (approximately 65 percent) of PCFG whales sighted in a given year. Also, PCFG whales exhibit extensive movements during a given year or from year to year, presumably searching for prey (Subsection 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem, and Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements). For example, Calambokidis et al. (2014) estimated that over 60 percent of PCFG whales that had been sighted on 6 or more days were seen somewhere in the OR-SVI area and across a latitudinal range of greater than 30 nautical miles (i.e., roughly equivalent to the coastal portion of the Makah U&A) (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements). Therefore, it is reasonable to expect that other PCFG whales could move in and take the place of whales that leave the Makah U&A or OR-SVI areas in response to hunting. For example, PCFG whales feeding outside the OR-SVI survey areas (e.g., whales from west Vancouver Island) could take the place of whales removed from the OR-SVI, and PCFG whales feeding outside the Makah U&A (e.g., from southern Vancouver Island) could take the place of whales removed from the Makah U&A. In addition, if there are other feeding areas that are not subject to hunting disturbance, the whales can and may easily move to those other areas. Over time and with ongoing hunt-related disturbance, fewer whales might use the hunt area (which is just one portion of the Makah U&A and OR-SVI areas), but such abandonment might be offset to some extent by new whales that recruit to the PCFG and have not been exposed to such disturbance.

Change in Numbers - Summary

Compared to the No-action Alternative in which no Makah U&A or OR-SVI whales are likely to be killed or disturbed by hunting, under Alternative 2 there is a risk that the killing or disturbance of whales caused by a Makah hunt could result in decreased numbers of whales using these survey areas during the summer period (especially if external recruits do not replace killed whales). It is likely that the number of whales would decrease but that gray whales would continue using these survey areas during the summer months because: the IWC analysis shows that PCFG whales would remain viable with a Makah hunt, PCFG whales are dense and abundant in the OR-SVI area, PCFG whales are highly mobile within the PCFG range, there are many new and returning whales available to replace killed whales, the bycatch limit for PCFG whales accounts for changes in OR-SVI whale numbers, and gray whales continue to return in large numbers to feeding areas where scores are actively hunted and killed each year (i.e., waters around Chukotka), suggesting that hunting will not cause them to abandon the PCFG feeding area.

4.4.3.2.5 Welfare of Individual Whales

As discussed in Subsection 4.1, Introduction, the number of gray whales that might be harvested from the ENP stock under all alternatives, including Alternative 2 and the No-action Alternative, would not change. It would remain at the existing IWC catch limit of 744 whales in a 6-year period, and no more than 140 whales in any one year. The difference is that under the No-action Alternative, the entire catch could be taken by Chukotka Natives, while under Alternative 2 the Makah Tribe could take up to 24 whales from the 744 whale catch limit.

A major difference between Alternative 2 and the No-action Alternative is in the number of gray whales that might be disturbed via vessel approaches and unsuccessful harpoon attempts. Assuming that Makah hunters could embark on hunting trips during 42.5 days per year, it is possible that 353 gray whales might be approached per year and 42 of those whales subjected to unsuccessful harpoon attempts (Subsection 4.1.2, Alternative 2) (Table 4-4). (The number of whales approached does not include the number that might be approached by vessels other than those used by Makah hunters). Some of these whales could be subsequently encountered during a hunt by Chukotkan natives (which would typically occur during the summer and fall months), so there is a greater potential for increased disturbance under Alternative 2 compared to the No-action Alternative. However, aside from struck and lost whales, the most severe form of disturbance—an unsuccessful harpoon attempt—would still be limited to 42 whales, which is a very small fraction (0.2 percent) of the entire ENP stock.

The proportion of whales struck and lost could be greater in a Makah hunt under Alternative 2 than a Chukotka Native hunt under the No-action Alternative because the Chukotka Natives have more recent hunting experience. The Chukotka Natives report that less than 3 percent of the whales struck in their hunt are lost. It is not possible to predict the proportion of whales that would be struck and lost in a Makah hunt under Alternative 2, but the Tribe's proposal includes a potential of three whales struck and lost for four whales harvested before the seven-strike limit would be reached. The proportion of whales struck and lost under Alternative 2 could also be greater than the proportion in a Chukotka Native hunt because seasonal restrictions on the Makah hunt under Alternative 2 could result in hunts occurring in rough weather and sea conditions. Hunting under unfavorable conditions could reduce the accuracy of the hunters and make it more difficult to successfully land a killed whale (thus increasing the proportion of whales struck and lost).

Whales killed with a rifle in a Makah hunt under Alternative 2 could experience a shorter time to death than whales killed with a rifle in a Chukotka Native hunt because of the requirements proposed by the Makah (such as minimum visibility) and because the Makah would use a higher caliber killing weapon than the Chukotka Natives use. Whales killed with an explosive grenade(s) in either hunt would likely experience a similar time to death. Thus, compared to the No-action Alternative, Alternative 2 could result in the same or shorter time to death, depending on the weapon used.

4.4.3.3 Alternative 3, Offshore Hunt

Alternative 3 would have the same conditions as Alternative 2 regarding the hunting season (December through May), limits on the numbers of ENP whales harvested, hunting methods, and regulatory framework. Alternative 3 would also have the same hunt area as Alternative 2, except that it would prohibit Makah hunters from making an initial strike on a gray whale within 5 miles (8 km) of shore (Makah hunters and chase boats may nevertheless have to follow any struck whale trailing harpoon lines to dispatch it, regardless of distance to shore). Alternative 3 also assumes that the Tribe would most likely conduct a motorized hunt and not use canoes, which could result in a higher likely number of hunting days (43 compared to 33) per year. Alternative 3 would differ from Alternative 2 in that a harvested whale would only count against the PCFG limit if it met the definition of a PCFG whale (i.e., it was sighted in at least 2 years in the PCFG seasonal range). Alternative 3 would also differ from Alternative 2 in that it would include a limit on the total mortality (including struck and lost whales) of PCFG whales (2.7 whales/year, using current estimates) and a related limit for female PCFG whales based on their proportional presence (1.6 females, using current estimates) (refer to Table 4-5). The result is that while an annual average of four whales might be harvested under either Alternative 2 or Alternative 3, the limits on PCFG whales under Alternative 3 would limit strikes to six whales per year and struck and lost whales to two per year. During any 6-year period, up to 24 whales might be harvested, with 36 struck and 12 struck and lost. As many as 353 whales may be approached by whale hunting vessels in any one year and up to 36 whales may be exposed to unsuccessful harpoon attempts. With up to four whales likely being harvested each year, there could be up to 64 rifle shots fired or 12 grenade explosions per year. Given the limited number of likely hunting days available under Alternative 3, the Tribe might not be able to harvest the full number of whales allowed.

4.4.3.3.1 Change in Abundance and Viability of the ENP Gray Whale Stock

Like Alternative 2, the potential direct and indirect mortality resulting from the whale hunt and hunt-related activities under Alternative 3 would be unlikely to change ENP gray whale stock abundance or viability compared to the No-action Alternative. As noted in Subsection 4.1, Introduction, the catch limit for the ENP gray whale stock set by the IWC would not change under this or any of the other alternatives; thus, the same number of ENP gray whales would likely be harvested over 6 years under Alternative 3 as under the No-action Alternative. If a Makah hunt for 24 whales over 6 years resulted in a higher level of stress-related mortality than would occur if those 24 whales were harvested in a Chukotkan native hunt under the No-action Alternative, the difference is unlikely to have an appreciable effect on the abundance and viability of the ENP gray whale stock as a whole. This is because the stress-related mortality associated with harvesting 24 whales over 6 years is likely to be minor in the context of the existing Chukotkan harvest level of 720 whales over 6 years.

If under the No-action Alternative the United States did not transfer unused portions of the catch limit to Russia, Alternative 3 would represent an increase in mortality of at most 28 gray whales over the 4 remaining years of the catch limit (2015 to 2018) (seven struck whales per year times 4 years), compared to the No-action Alternative. Because 28 whales are a tiny fraction of the overall ENP gray whale stock (0.1 percent), which has been stable over the past decade, the increase in mortalities under Alternative 3 would be extremely unlikely to affect gray whale viability compared to the No-action Alternative.

If PCFG whales are uniquely adapted to exploit feeding areas in the southern portion of the ENP summer range, and that adaptation were lost if the PCFG were compromised, Alternative 3 has the potential to affect the long-term viability of the ENP stock as a whole. However, as described in Subsection 4.4.3.2.3, Change in Abundance and Viability of PCFG Whales, the best available information indicates that the PCFG would still be viable with a hunt under Alternative 3, so there is no reason to believe that this alternative would have deleterious impacts on the ENP stock as a whole.

4.4.3.3.2 Change in Abundance and Viability of the WNP Gray Whale Stock

Available sighting data suggest that WNP whales could be encountered in the vicinity of the Makah U&A (Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements) during much of the hunting season under Alternative 3, perhaps with the exception of early May to late December.

There are insufficient data to discern whether hunters would be more or less likely to encounter WNP whales if hunting is restricted to offshore areas at least 5 miles (8 km) from the coast, but tracking data for two whales indicate that they could be encountered in such areas (Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements). Modeling based on Moore and Weller (2013) estimated that there was a very high chance (over 97 percent) that during a 6-year period a WNP whale would be approached by Makah hunters under Alternative 3. The chance of an attempted strike on at least one WNP whale in 6 years was 31 percent, while the chance of actually striking at least one WNP whale in 6 years was 6 percent (median estimates) (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014). These estimates represent a similar level of risk to WNP gray whales as under Alternative 2, and an increased risk to these whales compared to the No-action Alternative.

It is uncertain how whales would react to unsuccessful harpoon attempts, but the reaction may be similar to that observed in whales that are tagged or biopsied (i.e., a dramatic but temporary change in behavior).

While the chances of killing a WNP whale are low, even over a 6-year period, the loss of WNP whales, particularly reproductive females, from this small stock could be a conservation concern depending on the number lost and the time period over which such losses occurred. To mitigate for the possibility of a Makah hunt killing a WNP whale, regulations governing a hunt could require a suspension of the hunt if a WNP whale were killed. Procedures for photographing any whale that is landed would make it likely a WNP whale would be identified if it were landed. If a WNP whale were struck and lost, it is possible though not certain it could be identified.

4.4.3.3.3 Change in Abundance and Viability of PCFG Whales

Compared to the No-action Alternative, Alternative 3 could reduce the abundance of PCFG gray whales, which could in turn affect the viability of the PCFG.

As described in Subsection 4.1.3, Alternative 3 and Table 4-1, the current maximum number of PCFG whales that could be killed under Alternative 3 would be three per year. However, it is more likely that an average of one PCFG whale per year might actually be killed (and 7.2 whales over 6 years) given the high proportion of non-PCFG whales present in the Makah U&A during the spring portion of the hunting season when the Tribe is most likely to hunt. The annual average number is roughly half that expected under Alternative 2.

If one PCFG whale were killed in a year it would represent a 0.5 percent reduction in the current abundance estimate of 209 PCFG whales (Calambokidis et al. 2014). This would represent a small decrease in abundance (about half that expected under Alternative 2), compared to the No-action Alternative, during the year in which PCFG whales were removed. Over time, it is uncertain to what extent the death of one PCFG whale per year might decrease the abundance of the PCFG whales. During the years 1999 to 2011, there were 14.3 new recruits on average, 12.5 (87 percent) of which were not identified as calves (Subsection 3.4.3.4.1, PCFG Population Structure). At the current rate of recruitment, the PCFG abundance trend appears to be flat. It is possible that external recruits could increase, compared to the No-action Alternative, as a result of the removal of one PCFG whale; in which case, the abundance of the PCFG could remain at its current level.

In contrast to the No-action Alternative, Alternative 3 could reduce the likelihood of the PCFG being viable into the future by reducing the numbers of PCFG whales. As described above, the reduction under Alternative 3 would be roughly half that expected under Alternative 2. An analysis by the IWC Scientific Committee suggests the PCFG would nevertheless remain viable with a hunt under Alternative 3. As described in Subsection 4.4.2.3, Change in Abundance and Viability of PCFG Whales, the IWC's Scientific Committee recently evaluated the Makah hunt proposal (Alternative 2) using models with a 100-year time horizon. The committee's conclusion indicates that the PCFG would be viable as long as the hunt included the Tribe's bycatch formula to limit the strikes on PCFG whales and annual monitoring was conducted to assess the availability of PCFG whales in the Makah hunt. The committee's modeling used a bycatch formula that, under current population parameters, yields a bycatch limit of 3.0 PCFG whales per year. That value is much greater than the number of PCFG whales likely to be killed under Alternative 3 (i.e., one whale per year), which includes PCFG mortality limits that are more restrictive than the bycatch formula in Alternative 2 and the IWC analysis, indicating that the PCFG would still be viable with a hunt under Alternative 3. If the requisite monitoring indicated a higher availability of PCFG whales, then the IWC would likely reassess its conclusions via a new implementation review (Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates; IWC Implementation Review of PCFG Gray Whales).

During the likely hunting season (March through May) under Alternative 3, annually about 117 whales approached during hunt activities would be expected to be Makah U&A whales, while 131 would be expected to be OR-SVI whales (Subsection 4.1.3, Alternative 3) (Table 4-6). Thus, of the 353 whales potentially approached, approximately 33 percent (on average) would be Makah U&A whales and 37 percent would be OR-SVI whales. Of the 36 whales potentially subjected to harpoon attempts, six would be expected to be Makah U&A whales, and seven would be expected to be OR-SVI whales (which is roughly half the number of whales estimated under Alternative 2).

For the reasons described under Alternative 2 (Subsection 4.4.2.3, Change in Abundance and Viability of PCFG Gray Whales), it is unclear how whale distribution would be affected by hunt-related approaches and unsuccessful harpoon attempts. Whale response to approaches is likely to be temporary (minutes or hours), and Chukotkan hunters have approached, struck, and killed scores of gray whales over several years with no major changes apparent in whale numbers, distribution, or habitat use in that area. The availability of prey may be the factor most strongly affecting gray whale numbers in particular feeding areas within the PCFG range. If prey is available in other areas in the PCFG range, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Also, because whales typically feed in shallower nearshore areas of the Makah U&A, the offshore location of hunting activities under Alternative 3 might result in little or no change in whale distribution. Many new whales are seen in the PCFG range every year and there is significant interchange among survey areas within this range. Thus, even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area.

If hunting in the coastal portion of the Makah U&A did cause a change in distribution, it is likely that whales would shift to using adjacent areas—especially the Strait of Juan de Fuca portion of the Makah U&A and southern Vancouver Island—because those areas already have high rates of interchange with the proposed hunt area. Also, because hunting activities under Alternative 3 would end prior to the June through November feeding period, it is possible that PCFG whales might only temporarily avoid the coastal portion of the Makah U&A given that there would be 6 consecutive months with no hunting-related activities. It is also possible that PCFG whales would be less affected by hunting activities located further off shore from areas typically used by feeding whales. Thus, available information indicates that, like Alternative 2, gray whale distribution and habitat use under Alternative 3 would not change appreciably compared to the No-action Alternative.

4.4.3.3.4 <u>Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Survey Areas</u>

Compared to the No-action Alternative, Alternative 3 would result in gray whales being hunted in the coastal portion of the Makah U&A, which is a subset of the OR-SVI survey region and situated within the migration corridor of the entire ENP herd of gray whales. Such hunting could reduce the numbers of gray whales in these areas during the summer feeding period, either as a result of whales being killed or as a result of feeding whales changing their distribution during the summer feeding period.

Change in Numbers as a Result of Whales Being Killed

As described in Subsection 4.1.3, Alternative 3 and Table 4-1, the current maximum number of OR-SVI or Makah U&A whales killed would be three per year. However, it is more likely that an average of one OR-SVI whale or one Makah U&A whale might actually be killed each year (six whales from either area over 6 years) given the presumed proportional presence of these whales in the proposed hunt area during the March through May time period when the Tribe is most likely to hunt. (There is no information available to discern whether the Makah U&A whales or OR-SVI whales would be more or less likely to be encountered in the offshore hunt area established under Alternative 3.) Thus, approximately 50 percent fewer PCFG whales would be killed under Alternative 3 compared to Alternative 2.

For the reasons described above under Alternative 2 (Subsection 4.4.3.2.4, Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Survey Areas, Change in Numbers as a Result of Change in Distribution of Feeding Whales), sighting data since 1996 demonstrate that many new whales are seen each year in the OR-SVI and Makah U&A areas, and of these whales, variable but large numbers are seen (or never seen) again. Based on the annual average number of newly seen whales in the Makah U&A and OR-SVI survey areas (12 and 24 whales, respectively), it is possible that if up to one Makah U&A or OR-SVI whale were removed under Alternative 3, it would be replaced with another Makah U&A or OR-SVI whale. In that case, Alternative 3 would not result in a decrease in the total number of gray whales using the Makah U&A and OR-SVI survey areas during the summer feeding period, compared to the No-action Alternative. There is nevertheless a possibility that hunting under Alternative 3 might reduce the total number of whales using the OR-SVI area, and that reduction would be less than under Alternative 2. If that reduction occurred, the minimum abundance estimate for PCFG whales would decline, causing a decrease in the calculated PCFG mortality limit under Alternative 3. Also, while an ongoing hunt could reduce the number of whales returning to the Makah U&A and OR-SVI areas, it seems likely that such whales would be replaced in subsequent years given that an average of six newly-seen Makah U&A whales and 12 newly-seen OR-SVI whales are seen again in a subsequent year. If for some reason new whales (that become returning whales) did not take the place of killed returning whales in subsequent years, the calculated PCFG mortality limit would decrease over time as well. As an additional comparison, using the most recent minimum abundance estimate of 152 OR-SVI whales, an Rmax of 6.2 percent, and a recovery factor of 0.5, a PBR of 2.4 OR-SVI whales was calculated. This value is more than double the number of Makah U&A or OR-SVI whales likely removed under this alternative.

Change in Numbers as a Result of Change in Distribution of Feeding Whales

During the likely hunting season (March through May) under Alternative 3, annually about 117 whales approached during hunt activities would be expected to be Makah U&A whales, while 131 would be expected to be OR-SVI whales (Subsection 4.1.3, Alternative 3) (Table 4-6). Thus, of the 353 whales potentially approached, approximately 33 percent (on average) would be Makah U&A whales and 37 percent would be OR-SVI whales. Of the 36 whales potentially subjected to harpoon attempts, 12 would be expected to be Makah U&A whales and 13 would be expected to be OR-SVI whales (which is similar to the numbers of whales estimated under Alternative 2).

For the reasons described under Alternative 2 (Subsection 4.4.3.2.4, Change in Number of Gray Whales in the Makah U&A and OR-SVI Survey Areas; Change in Numbers as a Result of Change in Distribution of Feeding Whales), it is unclear what effect approaches and unsuccessful harpoon attempts would have on whale distribution. Whale response to approaches is likely to be temporary (minutes or hours), and Chukotkan hunters have approached, struck, and killed hundreds of gray whales over several years with no major changes apparent in gray whale numbers, distribution, or habitat use in that area. The availability of prey may be the factor most strongly affecting gray whale numbers in particular feeding areas within the PCFG range. If prey is available in the Makah U&A or OR-SVI, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Also, because whales typically feed in shallower nearshore areas of the Makah U&A, the offshore location of hunting activities under Alternative 3 might result in little or no change in whale distribution. Many new whales are seen in the Makah U&A and OR-SVI every year and there is significant interchange with whales from other adjacent areas in the PCFG range. Thus, even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area.

Change in Numbers - Summary

Compared to the No-action Alternative, in which no Makah U&A or OR-SVI whales are likely to be killed or disturbed by hunting, Alternative 3 represents a potential decrease in the number of whales using these survey areas during the summer period (especially if external recruits do not replace killed whales). While the same number of whales would be approached under Alternatives 2 and 3, slightly fewer whales would be subjected to harpoon attempts under Alternative 3 and these attempts would occur much further off shore from where Makah U&A and OR-SVI whales typically feed. As with Alternative 2, it is likely that the number of whales would decrease, but any decrease would be less than under Alternative 2 because fewer PCFG whales would likely be killed under Alternative 3 than under Alternative 2. As with Alternative 2, it is most likely that gray whales would continue using these survey areas during the summer months because: under Alternative 3, the PCFG mortality limit is similar to the limit from the bycatch formula used in Alternative 2 (and the IWC analysis) and the IWC analysis shows that PCFG whales would remain viable with a Makah hunt; the bycatch formula for Alternative 3 is more conservative than Alternative 2 because of its treatment of struck and lost whales and female whales (Table 4-1); PCFG whales are dense and abundant in the OR-SVI area; PCFG whales are highly mobile within the PCFG range; there are many new and returning whales available to replace killed whales; the bycatch limit for PCFG whales accounts for changes in PCFG whale numbers; and gray whales continue to return in large numbers to feeding areas where scores are actively hunted and killed each year (i.e., waters around Chukotka), suggesting that hunting will not cause them to abandon the PCFG feeding area.

4.4.3.3.5 <u>Welfare of Individual Whales</u>

As discussed in Subsection 4.1, Introduction, the number of gray whales that might be harvested from the ENP stock under all alternatives, including Alternative 3, would not change. It would remain at the existing IWC catch limit of 744 whales in a 6-year period and no more than 140 whales in any one year. The difference is that under the No-action Alternative, the entire catch could be taken by Chukotka Natives, while under Alternative 3 the Makah Tribe could take up to 24 whales from the 744 catch limit.

A major difference between Alternative 3 and the No-action Alternative is in the number of gray whales that might be disturbed by vessel approaches and unsuccessful harpoon attempts. Assuming that Makah hunters could embark on hunting trips during 60 days per year, it is possible that 353 gray whales might be approached per year and 36 of those whales subjected to unsuccessful harpoon attempts (Subsection 4.1.3, Alternative 3) (Table 4-6). The number of whales approached does not include the number that might be approached by vessels other than those used by Makah hunters. Compared to Alternative 2, it is likely that such approaches could be reduced because fewer protest vessels (especially small watercraft such as jet skis) would attempt to venture 5 miles (8 km) off shore under Alternative 3. Some of the whales subjected to approaches or unsuccessful harpoon attempts could be subsequently encountered during a hunt by Chukotkan natives (which would typically occur during the summer and fall months), so there is a greater potential for increased disturbance under Alternative 3 compared to the No-action Alternative. However, aside from struck and lost whales, the most severe form of disturbance—an unsuccessful harpoon attempt—would still be limited to 36 whales, which is a very small fraction (0.2 percent) of the entire ENP stock and roughly the same level of impact as Alternative 2.

Like Alternative 2, the proportion of whales struck and lost could be greater in a Makah hunt under Alternative 3 than a Chukotka Native hunt under the No-action Alternative because the Chukotka Natives have more recent hunting experience. The Chukotka Natives report that less than 3 percent of the whales struck in their hunt are lost. It is not possible to predict the proportion of whales that would be struck and lost in a Makah hunt under Alternative 3, but this alternative includes a potential of two whales struck and lost for four whales harvested before the 6-strike limit would be reached. The proportion of whales struck and lost under Alternative 3 could also be greater than the proportion in a Chukotka Native hunt because seasonal restrictions on the Makah hunt and the requirement under Alternative 3 to hunt at least 5 miles (8 km) from shore could result in hunts occurring in rough weather and sea conditions. Hunting under unfavorable conditions could reduce the accuracy of the hunters and make it more difficult to successfully land a killed whale (thus increasing the proportion of whales struck and lost).

Whales killed with a rifle in a Makah hunt under Alternative 3 could experience a shorter time to death than whales killed with a rifle in a Chukotka Native hunt because of the requirements proposed by the Makah (such as minimum visibility) and because the Makah would use a higher caliber killing weapon than the Chukotka Natives use. Whales killed with an explosive grenade(s) in either hunt would likely experience a similar time to death. Thus, a whale's time to death under Alternative 3 would be the same as under Alternative 2 and the same or less compared to the No-action Alternative.

4.4.3.4 Alternative 4, Summer/Fall Hunt

Alternative 4 would have the same conditions as Alternative 2 regarding the hunt area (coastal portion of the Makah U&A, including the provision to not strike a whale within 200 yards (183 m) of Tatoosh Island and White Rock), the hunting methods, and regulatory framework. In contrast to Alternatives 2 and 3, Alternative 4 would have a different hunting season that is restricted to summer/fall months to avoid times when WNP whales might be encountered, and would require hunters to approach only known ENP males. Like Alternative 3, Alternative 4 would differ from Alternative 2 in that it would include a limit on the total mortality (including struck and lost) of PCFG whales (1.43 whales/year, using current estimates). Under Alternative 4, the maximum number of whales that could be killed per year by the Tribe under current conditions would be one whale so as not to exceed the mortality limit. Unused portions of the PCFG mortality limit would not carry over to a subsequent year, except that when the mortality limit is less than 1 but greater than 0.5 during 2 consecutive years, it would be aggregated to allow for the mortality of one PCFG whale during the second year. During any 6-year period, up to six whales might be harvested, with six struck and six struck and lost. As many as 58 whales may be approached by whale hunting vessels in any one year and up to six whales may be exposed to unsuccessful harpoon attempts. With just one whale likely being harvested each year, there could be up to 16 rifle shots fired or 3 grenade explosions per year.

4.4.3.4.1 <u>Change in Abundance and Viability of the ENP Gray Whale Stock</u>

Like Alternatives 2 and 3, the potential direct and indirect mortality resulting from a whale hunt and hunt-related activities under Alternative 4 would be unlikely to change ENP gray whale stock abundance or viability compared to the No-action Alternative. As noted in Subsection 4.1, Introduction, the catch limit for the ENP gray whale stock set by the IWC would not change under this or any of the other alternatives; thus, the same number of ENP gray whales would likely be harvested over 6 years under Alternative 4 as under the No-action Alternative. If a Makah hunt for six whales over 6 years resulted in a higher level of stress-related mortality than would occur if those six whales were harvested in a Chukotkan hunt under the No-action Alternative, the difference is unlikely to have an appreciable effect on the abundance and viability of the ENP gray whale stock as a whole. This is because the stress-related mortality associated with harvesting six whales over 6 years is likely to be minor in the context of the existing Chukotkan harvest level of 720 whales over 6 years.

If under the No-action Alternative the United States did not transfer unused portions of the catch limit to Russia, Alternative 4 would represent an increase in mortality of at most four gray whales over the 4 remaining years of the catch limit (2015 to 2018) (one struck whale per year times 4 years) compared to the No-action Alternative. Because four whales are a tiny fraction of the overall ENP gray whale stock (0.02 percent), which has been stable over the past decade, the increase in mortalities under Alternative 4 would be extremely unlikely to affect gray whale viability compared to the No-action Alternative.

If PCFG whales are uniquely adapted to exploit feeding areas in the southern portion of the ENP summer range, and that adaptation were lost if the PCFG were compromised, Alternative 4 has the potential to affect the long-term viability of the ENP stock as a whole. However, as described in Subsection 4.4.3.2.3, Change in Abundance and Viability of PCFG Whales, the best available information indicates that the PCFG would still be viable with a hunt under Alternative 4, so there is no reason to believe that this alternative would have deleterious impacts on the ENP stock as a whole.

4.4.3.4.2 Change in Abundance and Viability of the WNP Gray Whale Stock

Available sighting data (Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements) indicate that WNP whales would not be encountered in the vicinity of the Makah U&A during the June through November hunt period considered under Alternative 4. Therefore, Alternative 4 would result in less risk to WNP gray whales than Alternatives 2 and 3, and about the same risk as under the No-action Alternative. In the unlikely event that a WNP whale was encountered, regulations governing a hunt could require a suspension of the hunt if a WNP whale were killed. Procedures for photographing any whale that is landed would make it likely a WNP whale would be identified if it were landed. If a WNP whale were struck and lost, it is possible though not certain, it could be identified.

4.4.3.4.3 Change in Abundance and Viability of PCFG Whales

Compared to the No-action Alternative, Alternative 4 could reduce the abundance of PCFG gray whales, which could in turn affect the viability of the PCFG.

As described in Subsection 4.1.4, Alternative 4 and Table 4-1, the potential number of PCFG whales killed under Alternative 4 would be determined by the PCFG limit, which would be one whale under current conditions. (Because Alternative 4, like Alternative 2, would allow seven strikes per year, the number of ENP whales potentially killed could be has high as seven, but this would require the PCFG abundance to more than triple, which is highly unlikely). The annual average harvest of one whale under Alternative 4 is roughly one-third that expected under Alternative 2 and the same as that expected under Alternative 3.

If one PCFG whale were killed in a year it would represent a 0.5 percent reduction in the current abundance estimate of 209 PCFG whales (Calambokidis et al. 2014). Compared to the No-action Alternative, this would represent a small decrease in abundance during the year in which PCFG whales were removed. This decrease would be the same as under Alternative 3 and about one-third that expected under Alternative 2. Over time, it is uncertain to what extent the death of one PCFG whale per year might decrease the abundance of the PCFG whales. During the years 1999 to 2011, there were 14.3 new recruits on average, 12.5 (87 percent) of which were not identified as calves (Subsection 3.4.3.4.1, PCFG Population Structure). At the current rate of recruitment, the PCFG abundance trend appears to be flat. It is possible that external recruits could increase, compared to the No-action Alternative, as a result of the removal of one PCFG whale, in which case the abundance of the PCFG could remain at its current level.

In contrast to the No-action Alternative, Alternative 4 could reduce the likelihood of the PCFG being viable into the future by reducing the numbers of PCFG whales. As described above, the reduction under Alternative 4 would be the same as under Alternative 3 and about one-third that expected under Alternative 2. An analysis by the IWC Scientific Committee suggests the PCFG would nevertheless remain viable with a hunt under Alternative 4. As described in Subsection 4.4.2.3, Change in Abundance and Viability of PCFG Whales, the IWC's Scientific Committee recently evaluated the Makah hunt proposal (Alternative 2) using models with a 100-year time horizon. That committee's conclusion indicates that the PCFG would be viable as long as the hunt included a bycatch formula to limit the strikes on PCFG whales and annual monitoring was conducted to assess the availability of PCFG whales in the Makah hunt. The committee's modeling used a bycatch formula that, under current population parameters, yielded a bycatch limit of 3.0 PCFG whales per year. That value is much greater than the number of PCFG whales likely to be killed under Alternative 4 (i.e., one whale per year), which includes a PCFG mortality limit that is more restrictive than the bycatch formula in Alternative 2 and the IWC analysis, indicating that the PCFG would still be viable with a hunt under Alternative 4. If the requisite monitoring indicated a higher availability of PCFG whales, then the IWC would likely reassess its conclusions via a new implementation review (Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates; IWC Implementation Review of PCFG Gray Whales). Currently, it is thought that whales have two means of recruiting into the PCFG: either a whale learns to feed within the PCFG range from its mother or it immigrates to the PCFG from the larger ENP population later in its life. Alternative 4 is less likely to affect PCFG viability into the future as compared to Alternatives 2 and 3 because the hunt would target males and would not affect matrilineal recruitment. For the reasons described under Alternative 2 (Subsection 4.4.3.2.3, Change in Abundance and Viability of PCFG Gray Whales), it is unclear how whale distribution would be affected by hunt-related approaches and unsuccessful harpoon attempts. Whale response to approaches is likely to be temporary (minutes or hours), and Chukotkan hunters have approached, struck, and killed scores of gray whales over several years with no major changes apparent in whale numbers, distribution, or habitat use in that area. The availability of prey may be the factor most strongly affecting gray whale numbers in particular feeding areas within the PCFG range. If prey is available in other areas in the PCFG range, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Many new whales are seen in the PCFG range every year and there is significant interchange among survey areas within this range. Thus, even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area.

If hunting in the coastal portion of the Makah U&A did cause a change in distribution, it is likely that whales would shift to using adjacent areas—especially the Strait of Juan de Fuca portion of the Makah U&A and southern Vancouver Island—because those areas already have high rates of interchange with the proposed hunt area. Although hunting activities under Alternative 4 would occur during the June through November feeding period, it is possible that PCFG whales might only temporarily avoid the coastal portion of the Makah U&A because hunting would likely occur on just 7 days (i.e., less than 4 percent of the entire summer/fall feeding period), with the lowest number of whales likely approached (58) compared to all other action alternatives, and only a single male whale that could be struck. Thus, available information indicates that, like Alternatives 2 and 3, gray whale distribution and habitat use under Alternative 4 would not change appreciably compared to the No-action Alternative.

4.4.3.4.4 Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Survey Areas

Compared to the No-action Alternative, Alternative 4 would result in gray whales being hunted in the coastal portion of the Makah U&A, which is a subset of the OR-SVI survey region and situated within the migration corridor of the entire ENP herd of gray whales. Such hunting could reduce the numbers of gray whales in these areas during the summer feeding period either as a result of whales being killed or as a result of feeding whales changing their distribution during the summer feeding period.

Change in Numbers as a Result of Whales Being Killed

As described in Subsection 4.1.4, Alternative 4 and Table 4-1, both the current maximum and likely number of OR-SVI or Makah U&A whales killed would be approximately one per year (six whales from either area over 6 years). Under Alternative 4, all killed whales would be expected to be Makah U&A and OR-SVI whales because of the hunt taking place during the summer feeding period for PCFG whales. The likely number of these whales killed is about the same as under Alternative 3 and roughly one-third that expected under Alternative 2.

For the reasons described above under Alternative 2, sighting data since 1996 demonstrate that many new whales are seen each year in the OR-SVI and Makah U&A areas, and of these whales, variable but large numbers are seen (or never seen) again. Based on the annual average number of newly seen whales in the Makah U&A and OR-SVI survey areas (12 and 24 whales, respectively), it is possible that if up to one Makah U&A or OR-SVI whale were removed under Alternative 4, it would be replaced with another Makah U&A or OR-SVI whale. In that case, Alternative 4 would not result in a decrease in the total number of gray whales using the Makah U&A and OR-SVI survey areas during the summer feeding period, compared to the No-action Alternative. There is nevertheless a possibility that hunting under Alternative 4 might reduce the total number of whales using the OR-SVI area, and that reduction would be less than under Alternative 2 and about the same as Alternative 3. If that reduction occurred, the minimum abundance estimate for PCFG whales would decline, causing a decrease in the calculated PCFG mortality limit under Alternative 4. Also, while an ongoing hunt could reduce the number of whales returning to the Makah U&A and OR-SVI areas, it seems likely that such whales would be replaced in subsequent years given that an average of 6 newly-seen Makah U&A whales and 12 newly-seen OR-SVI whales are seen again in a subsequent year. If for some reason new whales (that become returning whales) did not take the place of killed returning whales in subsequent years, the calculated PCFG mortality limit would decrease over time as well. As an additional comparison, using the most recent minimum abundance estimate of 152 OR-SVI whales, an Rmax of 6.2 percent, and a recovery factor of 0.5, a PBR of 2.4 OR-SVI whales was calculated. This value is more than double the number of Makah U&A or OR-SVI whales likely removed under this alternative.

Change in Numbers as a Result of Change in Distribution of Feeding Whales

Under Alternative 4, annually about 58 whales would be approached during hunt activities (Subsection 4.1.4, Alternative 4) (Table 4-8) and all would be expected to be Makah U&A and OR-SVI whales because of the hunt taking place during the summer feeding period for PCFG whales. For the same reason, all of the six whales potentially subjected to harpoon attempts would be Makah U&A and OR-SVI whales. This number of whales is roughly half that expected under Alternatives 2 and 3.

For the reasons described under Alternative 2, it is unclear what effect approaches and unsuccessful harpoon attempts would have on whale distribution. Whale response to approaches is likely to be temporary (minutes or hours), and Chukotkan hunters have approached, struck, and killed hundreds of gray whales over several years with no major changes apparent in gray whale numbers, distribution, or habitat use in that area. The availability of prey may be the factor most strongly affecting gray whale numbers in particular feeding areas within the PCFG range. If prey is available in the Makah U&A or OR-SVI, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Also, many new whales are seen in the Makah U&A and OR-SVI every year and there is significant interchange with whales from other adjacent areas in the PCFG range. Thus, even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area.

Change in Numbers - Summary

Compared to the No-action Alternative, in which no Makah U&A or OR-SVI whales are likely to be killed by hunting, Alternative 4 represents a potential decrease in the number of whales using these survey areas during the summer period (especially if external recruits do not replace killed whales). Alternative 4 would result in roughly half the number of whales approached as under Alternatives 2 and 3, with the number of harpoon attempts being roughly half the number of attempts under Alternatives 2 and 3 (but less likely to be in offshore waters compared to Alternative 3). As with Alternatives 2 and 3, it is likely that the number of whales would decrease, although any decrease would be less than under Alternatives 2 or 3 because fewer PCFG whales would likely be killed under Alternative 4 than under Alternatives 2 or 3. As with Alternatives 2 and 3, it is most likely that gray whales would continue using these survey areas during the summer months because: under Alternative 4, the PCFG mortality limit is more restrictive than the bycatch formula used in Alternative 2 (and the IWC analysis) by using a lower recovery factor and subtracting other human-caused mortality (Table 4-1), and the IWC analysis shows that PCFG whales would remain viable with a Makah hunt; PCFG whales are dense and abundant in the OR-SVI area; PCFG whales are highly mobile within the PCFG range; there are many new and returning whales available to replace killed whales; and gray whales continue to return in large numbers to feeding areas where scores are actively hunted and killed each year (i.e., waters around Chukotka), suggesting that hunting will not cause them to abandon the PCFG feeding area. Furthermore, hunting only males ensures that internal recruitment of PCFG whales would not be affected by the hunt.

4.4.3.4.5 Welfare of Individual Whales

As discussed in Subsection 4.1, Introduction, the number of gray whales that might be harvested from the ENP stock under all alternatives, including Alternative 4 and the No-action Alternative, would not change. It would remain at the existing IWC catch limit of 744 whales in a 6-year period, and no more than 140 whales in any one year. The difference is that under the No-action Alternative, the entire catch could be taken by Chukotka Natives, while under Alternative 4 the Makah Tribe could take up to 24 whales from the 744 catch limit.

A major difference between Alternative 4 and the No-action Alternative is in the number of gray whales that might be disturbed by vessel approaches and unsuccessful harpoon attempts. Assuming that Makah hunters could embark on hunting trips during 7 days per year, it is possible that 58 gray whales might be approached per year and six of those whales subjected to unsuccessful harpoon attempts (Subsection 4.1.4, Alternative 4) (Table 4-8). These impacts would be substantially lower overall than those expected under Alternatives 2 and 3. However, because the hunt under Alternative 4 is restricted to the summer and fall months and hunters may strike only known males, it is much more likely that impacts would be focused on PCFG whales.

The number of whales approached does not include the number that might be approached by vessels other than those used by Makah hunters. Some of the whales subjected to approaches or unsuccessful harpoon attempts could be encountered during a hunt by Chukotkan natives, but such encounters would most likely occur in a different year because the Makah Tribe's hunt would occur during the months when whales are likely to remain within the PCFG range. So while there is a greater potential for increased disturbance to individual whales under Alternative 4 compared to the No-action Alternative, such disturbance would likely be minimal and attenuated given that it would be many months between the time a whale was pursued in the Makah U&A and then in the Chukotkan hunt area (or vice versa). Aside from struck-and-lost whales, the most severe form of disturbance—an unsuccessful harpoon attempt—would still be limited to six whales, which is a very small fraction (0.02 percent) of the entire ENP stock and roughly one-tenth the impact expected under Alternatives 2 and 3.

Like Alternatives 2 and 3, the proportion of whales struck and lost could be greater in a Makah hunt under Alternative 4 than a Chukotka Native hunt under the No-action Alternative because the Chukotka Natives have more recent hunting experience. The Chukotka Natives report that less than 3 percent of the whales struck in their hunt are lost. It is not possible to predict the proportion of whales that would be struck and lost in a Makah hunt under Alternative 4, but given that only one whale could be struck (under current conditions), the proportion would be either zero or 100 percent. Alternative 4 would also have a lower likelihood of hunters striking and losing a whale compared to Alternatives 2 and 3 because ocean conditions during the summer and fall hunting months proposed under Alternative 4 would make it easier to land a struck whale than the less favorable ocean conditions during the spring hunting months of Alternatives 2 and 3.

Whales killed with a rifle in a Makah hunt under Alternative 4 could experience a shorter time to death than whales killed with a rifle in a Chukotka Native hunt because of the requirements proposed by the Makah (such as minimum visibility) and because the Makah would use a higher caliber killing weapon than the Chukotka Natives use. Whales killed with an explosive grenade(s) in either hunt would likely experience a similar time to death. Thus, a whale's time to death under Alternative 4 would be the same as under Alternatives 2 and 3, and the same or less compared to the No-action Alternative.

4.4.3.5 Alternative 5, Split-season Hunt

Alternative 5 would have the same conditions as Alternative 2 regarding the hunt area, hunting methods, and regulatory framework. In contrast, Alternative 5 would have a split hunting season (December 1 through 21 and May 10 through 31) intended to avoid killing a WNP whale and to minimize the chance of killing a PCFG whale. Like Alternatives 3 and 4, Alternative 5 would differ from Alternative 2 in that it would include a limit on the total mortality—including struck and lost—of PCFG whales (0.28 whales/year, using current estimates). Because this limit represents less than one whale, it would be allowed to accumulate across years for the purposes of calculating how frequently a PCFG whale could be killed or struck and lost. Although this PCFG mortality limit would always be less than one whale, the Tribe could hunt in any year—including the first year—until they either kill a PCFG whale or strike and lose any whale. If either of those two outcomes occur, then the PCFG mortality limit would be applied to determine the number of years the Tribe would need to take a hiatus from hunting (i.e., until the accumulated mortality limits would add up to at least one whale). During any 6-year period, up to 24 whales might be harvested, with 24 struck and 3 struck and lost (given the limit of one struck-and-lost whale per year coupled with the calculated mortality limit on PCFG whales). As many as 122 whales may be approached by whale hunting vessels in any one year and up to 30 whales may be exposed to unsuccessful harpoon attempts. With just one whale likely being harvested each year, there could be up to 16 rifle shots fired or 3 grenade explosions per year.

4.4.3.5.1 Change in Abundance and Viability of the ENP Gray Whale Stock

Like Alternatives 2, 3, and 4, the potential direct and indirect mortality resulting from the whale hunt and hunt-related activities under Alternative 5 would be unlikely to change ENP gray whale stock abundance or viability compared to the No-action Alternative. As noted in Subsection 4.1, Introduction, the catch limit for the ENP gray whale stock set by the IWC would not change under this or any of the other alternatives; thus, the same number of ENP gray whales would likely be harvested over 6 years under Alternative 5 as under the No-action Alternative. If a Makah hunt for six whales over 6 years resulted in a higher level of stress-related mortality than would occur if those six whales were harvested in a Chukotkan hunt under the No-action Alternative, the difference is unlikely to have an appreciable effect on the abundance and viability of the ENP gray whale stock as a whole. This is because the stress-related mortality associated with harvesting six whales over 6 years is likely to be minor in the context of the existing Chukotkan harvest level of 720 whales over 6 years.

If under the No-action Alternative the United States did not transfer unused portions of the catch limit to Russia, Alternative 5 would represent an increase in mortality of at most 20 gray whales over the 4 remaining years of the catch limit (2015 to 2018) (five struck whales per year times 4 years) compared to the No-action Alternative. Because 20 whales are a tiny fraction of the overall ENP gray whale stock (0.1 percent), which has been stable over the past decade, the increase in mortalities under Alternative 5 would be extremely unlikely to affect gray whale viability compared to the No-action Alternative.

If PCFG whales are uniquely adapted to exploit feeding areas in the southern portion of the ENP summer range, and that adaptation were lost if the PCFG were compromised, Alternative 5 has the potential to affect the long-term viability of the ENP stock as a whole. However, as described in Subsection 4.4.3.2.3, Change in Abundance and Viability of PCFG Whales, the best available information indicates that the PCFG would still be viable with a hunt under Alternative 5, so there is no reason to believe that this alternative would have deleterious impacts on the ENP stock as a whole.

4.4.3.5.2 Change in Abundance and Viability of the WNP Gray Whale Stock

There are very limited data for WNP whales in the project area, but the available sighting data (Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements) indicate that WNP whales are unlikely to be encountered in the vicinity of the Makah U&A during the short hunt periods in May and December considered under Alternative 5. However, the data available for the hunt period is too sparse to verify that the risk of taking a WNP whale would be different than during other time periods of the migratory season, and thus we have analyzed the risk of taking a WNP whale using the same model by Moore and Weller (2013) used for Alternatives 2 and 3. Modeling based on Moore and Weller (2013) estimated that there was a nearly 72 percent chance that during a 6-year period a WNP whale would be approached by Makah hunters under Alternative 5. The chance of an attempted strike on at least one WNP whale in 6 years was 27 percent, while the chance of actually striking at least one WNP whale in 6 years was 5 percent (median estimates) (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014). Therefore, assuming that the availability of WNP whales is the same during the proposed hunt period as during the rest of the migratory season, Alternative 5 would result in increased risk to WNP gray whales compared to the No-action Alternative and Alternative 4, and slightly less risk than under Alternatives 2 and 3.

It is uncertain how whales would react to unsuccessful harpoon attempts, but the reaction may be similar to that observed in whales that are tagged or biopsied (i.e., a dramatic but temporary change in behavior).

While the chances of killing a WNP whale are low, even over a 6-year period, the loss of WNP whales, particularly reproductive females, from this small stock could be a conservation concern depending on the number lost and the time period over which such losses occurred. To mitigate for the possibility of a Makah hunt killing a WNP whale, regulations governing a hunt could require a suspension of the hunt if a WNP whale were killed. Procedures for photographing any whale that is landed would make it likely a WNP whale would be identified if it were landed. If a WNP whale were struck and lost, it is possible, though not certain, it could be identified.

4.4.3.5.3 Change in Abundance and Viability of PCFG Whales

Compared to the No-action Alternative, Alternative 5 could reduce the abundance of PCFG gray whales, which could in turn affect the viability of the PCFG.

As described in Subsection 4.1.5, Alternative 5 and Table 4-1, the current maximum number of PCFG whales that could be killed under Alternative 5 would be one whale per 2 years. However, it is more likely that an average of one PCFG whale per 5 years might actually be killed given the high proportion of non-PCFG whales present in the Makah U&A during the spring portion of the hunting season when the Tribe is most likely to hunt. The annual average number is approximately 86 percent lower than that expected under Alternatives 3 and 4, and 94 percent lower than that expected under Alternative 2.

If one PCFG whale were killed every 5 years (i.e., 0.2 whales per year) it would represent a 0.1 percent reduction in the current abundance estimate of 209 PCFG whales (Calambokidis et al. 2014). Compared to the No-action Alternative, this would represent an extremely small decrease in abundance during the year in which PCFG whales were removed. This decrease would be at least an order of magnitude smaller than the decreases expected under Alternatives 2, 3, and 4. Over time, it is uncertain to what extent the death of one PCFG whale per 5 years might decrease the abundance of the PCFG.

During the years 1999 to 2011, there were 14.3 new recruits on average, 12.5 (87 percent) of which were not identified as calves (Subsection 3.4.3.4.1, PCFG Population Structure). At the current rate of recruitment, the PCFG abundance trend appears to be flat. It is possible that external recruits could increase, compared to the No-action Alternative, as a result of the removal of one PCFG whale every 5 years, in which case the abundance of the PCFG could remain at its current level.

In contrast to the No-action Alternative, Alternative 5 could reduce the likelihood of the PCFG being viable into the future by reducing the numbers of PCFG whales. As described above, the reduction under Alternative 5 would be at least an order of magnitude smaller than the reduction expected under Alternatives 2, 3, and 4. An analysis by the IWC Scientific Committee suggests the PCFG would nevertheless remain viable with a hunt under Alternative 5. As described in Subsection 4.4.2.3, Change in Abundance and Viability of PCFG Whales, the IWC's Scientific Committee recently evaluated the Makah hunt proposal (Alternative 2) using models with a 100-year time horizon. The committee's conclusion indicates that the PCFG would be viable as long as the hunt included a bycatch formula to limit the strikes on PCFG whales and annual monitoring was conducted to assess availability of PCFG whales in the Makah hunt. The committee's modeling used a bycatch formula that, under current population parameters, yielded a bycatch limit of 3.0 PCFG whales per year. That value is much greater than the number of PCFG whales likely to be killed under Alternative 5 (i.e., 0.2 whales per year), which includes a PCFG mortality limit that is more restrictive than the bycatch formula in Alternative 2 and the IWC analysis, indicating that the PCFG would still be viable with a hunt under Alternative 5. If the requisite monitoring indicated a higher availability of PCFG whales, then the IWC would likely reassess its conclusions via a new implementation review (Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates; IWC Implementation Review of PCFG Gray Whales).

For the reasons described under Alternative 2, it is unclear how whale distribution would be affected by hunt-related approaches and unsuccessful harpoon attempts. Whale response to approaches is likely to be temporary (minutes or hours), and Chukotkan hunters have approached, struck, and killed scores of gray whales over several years with no major changes apparent in whale numbers, distribution, or habitat use in that area. The availability of prey may be the factor most strongly affecting gray whale numbers in particular feeding areas within the PCFG range. If prey is available in other areas in the PCFG range, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Many new whales are seen in the PCFG range every year and there is significant interchange among survey areas within this range. Thus, even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area.

If hunting in the coastal portion of the Makah U&A did cause a change in distribution, it is likely that whales would shift to using adjacent areas—especially the Strait of Juan de Fuca portion of the Makah U&A and southern Vancouver Island—because those areas already have high rates of interchange with the proposed hunt area. Also, because hunting activities under Alternative 5 would end prior to the June through November feeding period, it is possible that PCFG whales might only temporarily avoid the coastal portion of the Makah U&A given that there would be 6 consecutive months with no hunting-related activities. It is also possible that PCFG whales would be less affected by hunting activities that are limited to 11 days per year outside the time when PCFG whales typically feed in the hunt area. Thus, available information indicates that, like Alternatives 2, 3, and 4, gray whale distribution and habitat use under Alternative 5 would not change appreciably compared to the No-action Alternative.

4.4.3.5.4 Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Survey Areas

Compared to the No-action Alternative, Alternative 5 would result in gray whales being hunted in the coastal portion of the Makah U&A, which is a subset of the OR-SVI survey region and situated within the migration corridor of the entire ENP herd of gray whales. Such hunting could reduce the numbers of gray whales in these areas during the summer feeding period either as a result of whales being killed or as a result of feeding whales changing their distribution during the summer feeding period.

Change in Numbers as a Result of Whales Being Killed

As described in Subsection 4.1.5, Alternative 5 and Table 4-1, the current maximum number of OR-SVI or Makah U&A whales killed would be one per year. However, it is more likely that an average of one OR-SVI whale or one Makah U&A whale might actually be killed every 5 years given the presumed proportional presence of these whales in the proposed hunt area during the May time period when the Tribe is most likely to hunt. The likely number of these whales killed (approximately 0.16 to 0.18 whales per year) is much lower than the one to two whales likely killed each year under Alternatives 2, 3, and 4.

For the reasons described above under Alternative 2, sighting data since 1996 demonstrate that many new whales are seen each year in the OR-SVI and Makah U&A areas, and of these whales, variable but large numbers are seen (or never seen) again. Based on the annual average number of newly seen whales in the Makah U&A and OR-SVI survey areas (12 and 24 whales, respectively), it is very likely that if one Makah U&A or OR-SVI whale were removed every 5 years under Alternative 5, it would be replaced with another Makah U&A or OR-SVI whale. In that case, Alternative 5 would not result in a decrease in the total number of gray whales using the Makah U&A and OR-SVI survey areas during the summer feeding period, compared to the No-action Alternative. There is nevertheless a possibility that hunting under Alternative 5 might reduce the total number of whales using the OR-SVI area, and that reduction would be much less than under Alternatives 2, 3, and 4. If that reduction occurred, the minimum abundance estimate for PCFG whales would decline, causing a decrease in the calculated PCFG mortality limit under Alternative 5. Also, while an ongoing hunt could reduce the number of whales returning to the Makah U&A and OR-SVI areas, it seems likely that such whales would be replaced in subsequent years given that an average of 6 newly-seen Makah U&A whales and 12 newly-seen OR-SVI whales are seen again in a subsequent year. If for some reason new whales (that become returning whales) did not take the place of killed returning whales in subsequent years, the calculated PCFG mortality limit would decrease over time as well. As an additional comparison, using the most recent minimum abundance estimate of 152 OR-SVI whales, an Rmax of 6.2 percent, and a recovery factor of 0.5, a PBR of 2.4 OR-SVI whales was calculated. This value is more than 13 times greater than the number of Makah U&A or OR-SVI whales likely removed under this alternative.

Change in Numbers as a Result of Change in Distribution of Feeding Whales

During the split hunting season (3 weeks each in May and December) under Alternative 5, annually about 40 whales approached during hunt activities would be expected to be Makah U&A whales, while 45 would be expected to be OR-SVI whales (Subsection 4.1.5, Alternative 5) (Table 4-10). Thus, of the 122 whales potentially approached, approximately 33 percent (on average) would be Makah U&A whales and 37 percent would be OR-SVI whales. Of the 30 whales potentially subjected to harpoon attempts, 1.0 would be expected to be a Makah U&A whale and 1.1 would be expected to be OR-SVI whales. These numbers are roughly one-sixth of those expected under Alternative 4, and are substantially lower than the 12 to 16 whales expected under Alternatives 2 and 3.

For the reasons described under Alternative 2, it is unclear what effect approaches and unsuccessful harpoon attempts would have on whale distribution. Whale response to approaches is likely to be temporary (minutes or hours), and Chukotkan hunters have approached, struck, and killed hundreds of gray whales over several years with no major changes apparent in gray whale numbers, distribution, or habitat use in that area. The availability of prey may be the factor most strongly affecting gray whale numbers in particular feeding areas within the PCFG range. If prey is available in the Makah U&A or OR-SVI, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Also, many new whales are seen in the Makah U&A and OR-SVI every year and there is significant interchange with whales from other adjacent areas in the PCFG range. Thus, even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area.

Change in Numbers - Summary

Compared to the No-action Alternative, in which no Makah U&A or OR-SVI whales are likely to be killed by hunting, Alternative 5 represents a potential decrease in the number of whales using these survey areas during the summer period (especially if external recruits do not replace killed whales). The 40 to 45 whales approached under Alternative 5 would be lower (22 to 70 percent lower) than the number approached under Alternatives 2, 3, and 4, while the number of harpoon attempts under Alternative 5 would be substantially lower (82 to 93 percent lower). As with Alternatives 2, 3, and 4, it is likely that the number of whales would decrease, although any decrease would be less than under Alternatives 2, 3, and 4 because fewer PCFG whales would likely be killed under Alternative 5 than under Alternatives 2, 3, and 4. Under Alternative 5, the number of PCFG whales killed would be so small (0.2 per year) that the removal of whales would be unlikely to have an effect on the number of whales in the Makah U&A and OR-SVI survey areas over time.

As with Alternatives 2, 3, and 4, it is most likely that gray whales would continue using these survey areas during the summer months because: under Alternative 5, the PCFG mortality limit is more restrictive than the bycatch formula used in Alternative 2 (and the IWC analysis) by its treatment of struck and lost whales (Table 4-1), and the IWC analysis shows that PCFG whales would remain viable with a Makah hunt; PCFG whales are dense and abundant in the OR-SVI area; PCFG whales are highly mobile within the PCFG range; there are many new and returning whales available to replace killed whales; and gray whales continue to return in large numbers to feeding areas where scores are actively hunted and killed each year (i.e., waters around Chukotka), suggesting that hunting will not cause them to abandon the PCFG feeding area.

4.4.3.5.5 Welfare of Individual Whales

As discussed in Subsection 4.1, Introduction, the number of gray whales that might be harvested from the ENP stock under all alternatives, including Alternative 5 and the No-action Alternative, would not change. It would remain at the existing IWC catch limit of 744 whales in a 6-year period and no more than 140 whales in any one year. The difference is that under the No-action Alternative, the entire catch could be taken by Chukotka Natives, while under Alternative 5 the Makah Tribe could take up to 24 whales from the 744 catch limit.

A major difference between Alternative 5 and the No-action Alternative is in the number of gray whales that might be disturbed by vessel approaches and unsuccessful harpoon attempts. Assuming that Makah hunters could embark on hunting trips during 22 days per year, it is possible that 122 gray whales might be approached per year and 30 of those whales subjected to unsuccessful harpoon attempts (Subsection 4.1.5, Alternative 5) (Table 4-10). (The number of whales approached does not include the number that might be approached by vessels other than those used by Makah hunters). Some of these whales could be subsequently encountered during a hunt by Chukotkan natives (which typically occur during the summer and fall months), so there is a greater potential for increased disturbance under Alternative 5 compared to the No-action Alternative. However, aside from struck-and-lost whales, the most severe form of disturbance—an unsuccessful harpoon attempt—would still be limited to 30 whales, which is a very small fraction (0.1 percent) of the entire ENP stock. This would result in roughly the same level of impact as Alternatives 2 and 3, but approximately 5 times the impact expected under Alternative 4.

Like Alternatives 2, 3, and 4, the proportion of whales struck and lost could be greater in a Makah hunt under Alternative 5 than a Chukotka Native hunt under the No-action Alternative because the Chukotka Natives have more recent hunting experience. The Chukotka Natives report that less than 3 percent of the whales struck in their hunt are lost. It is not possible to predict the proportion of whales that would be struck and lost in a Makah hunt under Alternative 5, but this alternative includes a potential of one whale struck and lost for four whales harvested. The proportion of whales struck and lost under Alternative 5 could also be greater than the proportion in a Chukotka Native hunt because seasonal restrictions on the Makah hunt under Alternative 5 could result in hunts occurring in rough weather and sea conditions. Hunting under unfavorable conditions could reduce the accuracy of the hunters and make it more difficult to successfully land a killed whale (thus increasing the proportion of whales struck and lost).

Whales killed with a rifle in a Makah hunt under Alternative 5 could experience a shorter time to death than whales killed with a rifle in a Chukotka Native hunt because of the requirements proposed by the Makah (such as minimum visibility) and because the Makah would use a higher caliber killing weapon than the Chukotka Natives use. Whales killed with an explosive grenade(s) in either hunt would likely experience a similar time to death. Thus, a whale's time to death under Alternative 5 would be the same as under Alternatives 2, 3, and 4, and the same or less compared to the No-action Alternative.

4.4.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Alternative 6 would have the same conditions as Alternative 2 regarding the hunt area (coastal portion of the Tribe's U&A), hunting season (December 1 through May 31), and hunting methods. In contrast to Alternative 2, Alternative 6 would have different limits on strikes. Under Alternative 2, there would be a limit of seven strikes per year, while under Alternative 6 there would be a limit of 7 strikes over a 2-year period, or 3.5 strikes per year on average. Also, under Alternative 6, a harvested whale would only count against the PCFG limit if it met the definition of a PCFG whale (i.e., it was sighted in at least 2 years in the

PCFG seasonal range). Like Alternatives 3, 4, and 5, Alternative 6 would differ from Alternative 2 in that it would include a limit on the total mortality—including struck and lost—of PCFG whales (2.2 whales/year, using current estimates). The maximum number of whales that could be killed would be four in a single year, seven over 2 years, and 3.5 per year on average. During any 6-year period, up to 21 whales might be harvested, struck, or struck and lost. For this analysis, we assume that whales that are struck will die. As many as 353 whales may be approached by whale hunting vessels in any one year and up to 21 whales may be exposed to unsuccessful harpoon attempts. With an annual average of up to 3.5 whales likely being harvested, there could be up to 56 rifle shots fired or 11 grenade explosions per year. Given the limited number of likely hunting days available under Alternative 6, the Tribe might not be able to harvest the full number of whales allowed. Finally, Alternative 6 would differ from Alternative 2 in the regulatory regime adopted, in particular the waiver of the take moratorium and implementing regulations would last only 10 years and permits would be issued for a shorter term (3 years instead of 5). It is not possible to predict whether they would be replaced with a new waiver, regulations, and permits or what, if any, the new terms would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

4.4.3.6.1 Change in Abundance and Viability of the ENP Gray Whale Stock

Like Alternatives 2 through 5, the potential direct and indirect mortality resulting from the whale hunt and hunt-related activities under Alternative 6 would be unlikely to change ENP gray whale stock abundance or viability compared to the No-action Alternative. As noted in Subsection 4.1, Introduction, the catch limit for the ENP gray whale stock set by the IWC would not change under this or any of the other alternatives; thus, the same number of ENP gray whales would likely be harvested over 6 years under Alternative 6 as under the No-action Alternative. If a Makah hunt for 21 whales over 6 years resulted in a higher level of stress-related mortality than would occur if those 21 whales were harvested in a Chukotkan hunt under the No-action Alternative, the difference is unlikely to have an appreciable effect on the abundance and viability of the ENP gray whale stock as a whole. This is because the stress-related mortality associated with harvesting 21 whales over 6 years is likely to be minor in the context of the existing Chukotkan harvest level of 720 whales over 6 years.

If under the No-action Alternative the United States did not transfer unused portions of the catch limit to Russia, Alternative 6 would represent an increase in mortality of at most 14 gray whales over the 4 remaining years of the catch limit (2015 to 2018) (3.5 struck whales per year times 4 years) compared to the No-action Alternative. Because 14 whales are a tiny fraction of the overall ENP gray whale stock (0.1 percent), which has been stable over the past decade, the increase in mortalities under Alternative 6 would be extremely unlikely to affect gray whale viability compared to the No-action Alternative.

If PCFG whales are uniquely adapted to exploit feeding areas in the southern portion of the ENP summer range, and that adaptation were lost if the PCFG were compromised, Alternative 6 has the potential to affect the long-term viability of the ENP stock as a whole. However, as described in Subsection 4.4.3.2.3, Change in Abundance and Viability of PCFG Whales, the best available information indicates that the PCFG would still be viable with a hunt under Alternative 6, so there is no reason to believe that this alternative would have deleterious impacts on the ENP stock as a whole.

4.4.3.6.2 Change in Abundance and Viability of the WNP Gray Whale Stock

There are very limited data for WNP whales in the project area, but the available sighting data (Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements) suggest that WNP whales could be encountered in the vicinity of the Makah U&A during much of the hunting season under Alternative 3, perhaps with the exception of early May to late December. Modeling based on Moore and Weller (2013) estimated that there was a very high chance (over 97 percent) that during a 6-year period a WNP whale would be approached by Makah hunters under Alternative 6. The chance of an attempted strike on at least one WNP whale in 6 years was 20 percent, while the chance of actually striking at least one WNP whale in 6 years was 4 percent (median estimates) (J. Moore, pers. comm., NOAA Fisheries Wildlife Biologist, November 7, 2013, and June 12, 2014). Therefore, Alternative 6 would result in increased risk to WNP gray whales compared to the No-action Alternative and Alternative 4, and less risk (especially in terms of strikes and attempted strikes) compared to Alternatives 2, 3, and 5.

It is uncertain how whales would react to unsuccessful harpoon attempts, but the reaction may be similar to that observed in whales that are tagged or biopsied (i.e., a dramatic but temporary change in behavior).

While the chances of killing a WNP whale are low, even over a 6-year period, the loss of WNP whales, particularly reproductive females, from this small stock could be a conservation concern depending on the number lost and the time period over which such losses occurred. To mitigate for the possibility of a Makah hunt killing a WNP whale, regulations governing a hunt could require a suspension of the hunt if a WNP whale were killed. Procedures for photographing any whale that is landed would make it likely a WNP whale would be identified if it were landed. If a WNP whale were struck and lost, it is possible, though not certain, it could be identified.

4.4.3.6.3 Change in Abundance and Viability of PCFG Whales

Compared to the No-action Alternative, Alternative 6 could reduce the abundance of PCFG gray whales, which could in turn affect the viability of the PCFG.

As described in Subsection 4.1.6, Alternative 6 and Table 4-1, the current maximum number of PCFG whales that could be killed under Alternative 6 would be 3.5 whales per year. However, it is more likely that an average of one PCFG whale per year might actually be killed (and 8.5 whales over 6 years) given the high proportion of non-PCFG whales present in the Makah U&A during the spring portion of the hunting season when the Tribe is most likely to hunt. The annual average number is roughly one-third that expected under Alternative 2, nearly the same as Alternatives 3 and 4, and roughly 7 times higher than that expected under Alternative 5.

If one PCFG whale were killed in a year it would represent a 0.5 percent reduction in the current abundance estimate of 209 PCFG whales (Calambokidis et al. 2014). Compared to the No-action Alternative, this would represent a small decrease in abundance during the year in which PCFG whales were removed. This decrease would be about half that expected under Alternative 2, the same as under Alternatives 3 and 4, and 7 times higher than under Alternative 5. Over time, it is uncertain to what extent the death of one PCFG whale per year might decrease the abundance of the PCFG. During the years 1999 to 2011, there were 14.3 new recruits on average, 12.5 (87 percent) of which were not identified as calves (Subsection 3.4.3.4.1, PCFG Population Structure). At the current rate of recruitment, the PCFG abundance trend appears to be flat. It is possible that external recruits could increase, compared to the No-action Alternative, as a result of the removal of one PCFG whale, in which case the abundance of the PCFG could remain at its current level.

In contrast to the No-action Alternative, Alternative 6 could reduce the likelihood of the PCFG being viable into the future by reducing the numbers of PCFG whales. As described above, the reduction under Alternative 6 would be about half that expected under Alternative 2, the same as under Alternatives 3 and 4, and 7 times greater than under Alternative 5. An analysis by the IWC Scientific Committee suggests the PCFG would nevertheless remain viable with a hunt under Alternative 6. As described in Subsection 4.4.2.3, Change in Abundance and Viability of PCFG Whales, the IWC's Scientific Committee recently evaluated the Makah hunt proposal (Alternative 2) using models with a 100-year time horizon. The committee's conclusion indicates that the PCFG would be viable as long as the hunt included the Tribe's bycatch formula to limit the strikes on PCFG whales and annual monitoring was conducted to assess availability of PCFG whales in the Makah hunt. The committee's modeling used the Tribe's bycatch formula which, under current population parameters, yielded a bycatch limit of 3.0 PCFG whales per year. That value is much greater than the number of PCFG whales likely to be killed under Alternative 6 (i.e., one whale per year), which includes a PCFG mortality limit that is more restrictive than the bycatch formula in Alternative 2 and the IWC analysis, indicating that the PCFG would still be viable with a hunt under Alternative 6. If the requisite monitoring indicated a higher availability of PCFG whales, then the IWC would likely reassess its conclusions via a new implementation review (Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity (K), and Related Estimates; IWC Implementation Review of PCFG Gray Whales).

For the reasons described under Alternative 2, it is unclear how whale distribution would be affected by hunt-related approaches and unsuccessful harpoon attempts. Whale response to approaches is likely to be temporary (minutes or hours), and Chukotkan hunters have approached, struck, and killed scores of gray whales over several years with no major changes apparent in whale numbers, distribution, or habitat use in that area. The availability of prey may be the factor most strongly affecting gray whale numbers in particular feeding areas within the PCFG range. If prey is available in other areas in the PCFG range, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Many new whales are seen in the PCFG range every year and there is significant interchange among survey areas within this range. Thus, even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area.

If hunting in the coastal portion of the Makah U&A did cause a change in distribution, it is likely that whales would shift to using adjacent areas—especially the Strait of Juan de Fuca portion of the Makah U&A and southern Vancouver Island—because those areas already have high rates of interchange with the proposed hunt area. Also, because hunting activities under Alternative 6 would end prior to the June through November feeding period, it is possible that PCFG whales might only temporarily avoid the coastal portion of the Makah U&A given that there would be 6 consecutive months with no hunting-related activities. Thus, available information indicates that, like Alternatives 2 through 5, gray whale distribution and habitat use under Alternative 6 would not change appreciably compared to the No-action Alternative.

4.4.3.6.4 <u>Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Survey Areas</u>

Compared to the No-action Alternative, Alternative 6 would result in gray whales being hunted in the coastal portion of the Makah U&A, which is a subset of the OR-SVI survey region and situated within the migration corridor of the entire ENP herd of gray whales. Such hunting could reduce the numbers of gray whales in these areas during the summer feeding period either as a result of whales being killed or as a result of feeding whales changing their distribution during the summer feeding period.

Change in Numbers as a Result of Whales Being Killed

As described in Subsection 4.1.6, Alternative 6 and Table 4-12, the current maximum number of OR-SVI or Makah U&A whales killed would be 3.5 per year. However, it is more likely that an average of one OR-SVI whale or one Makah U&A whale might actually be killed each year given the presumed proportional presence of these whales in the proposed hunt area during the March through May time period when the Tribe is most likely to hunt. The likely number of these whales killed is approximately four times higher than those expected under Alternative 5, roughly the same as those expected under Alternatives 3 and 4, and about half the expected number under Alternative 2.

For the reasons described above under Alternative 2, sighting data since 1996 demonstrate that many new whales are seen each year in the OR-SVI and Makah U&A areas, and of these whales, variable but large numbers are seen (or never seen) again. Based on the annual average number of newly seen whales in the Makah U&A and OR-SVI survey areas (12 and 24 whales, respectively), it is very likely that if one Makah U&A or OR-SVI whale were removed every year under Alternative 6, it would be replaced with another Makah U&A or OR-SVI whale. In that case, Alternative 6 would not result in a decrease in the total number of gray whales using the Makah U&A and OR-SVI survey areas during the summer feeding period, compared to the No-action Alternative. There is nevertheless a possibility that hunting under Alternative 6 might reduce the total number of whales using the OR-SVI area, and that reduction would be about the same as under Alternatives 3 and 4, about half the number expected under Alternative 2, and much higher than the number expected under Alternative 5. If that reduction occurred, the minimum abundance estimate for PCFG whales would decline, causing a decrease in the calculated PCFG mortality limit under Alternative 6. Also, while an ongoing hunt could reduce the number of whales returning to the Makah U&A and OR-SVI areas, it seems likely that such whales would be replaced in subsequent years given that an average of 6 newly-seen Makah U&A whales and 12 newly-seen OR-SVI whales are seen again in a subsequent year. If for some reason new whales (that become returning whales) did not take the place of killed returning whales in subsequent years, the calculated PCFG mortality limit would decrease over time as well. As an additional comparison, using the most recent minimum abundance estimate of 152 OR-SVI whales, an Rmax of 6.2 percent, and a recovery factor of 0.5, yielded a PBR of 2.4 OR-SVI whales. This value is more than double the number of Makah U&A or OR-SVI whales likely removed under this alternative.

Change in Numbers as a Result of Change in Distribution of Feeding Whales

During the likely hunting season (March through May) under Alternative 6, annually about 117 whales approached during hunt activities would be expected to be Makah U&A whales, while 131 would be expected to be OR-SVI whales (Subsection 4.1.6, Alternative 6) (Table 4-12). Thus, of the 353 whales potentially approached, approximately 33 percent (on average) would be Makah U&A whales and 37 percent would be OR-SVI whales. Of the 21 whales potentially subjected to harpoon attempts, 7 would be expected to be Makah U&A whales and 7.8 would be expected to be OR-SVI whales. These numbers are approximately four times higher than those expected under Alternative 5, roughly the same as those expected under Alternative 4, and about half the expected number under Alternatives 2 and 3.

For the reasons described under Alternative 2, it is unclear what effect approaches and unsuccessful harpoon attempts would have on whale distribution. Whale response to approaches is likely to be temporary (minutes or hours), and Chukotkan hunters have approached, struck, and killed hundreds of gray whales over several years with no major changes apparent in gray whale numbers, distribution, or habitat use in that area. The availability of prey may be the factor most strongly affecting gray whale numbers in particular feeding areas within the PCFG range. If prey is available in the Makah U&A or OR-SVI, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Also, many new whales are seen in the Makah U&A and OR-SVI every year and there is significant interchange with whales from other adjacent areas in the PCFG range. Thus, even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area.

Change in Numbers - Summary

Compared to the No-action Alternative in which no Makah U&A or OR-SVI whales are likely to be killed by hunting, Alternative 6 represents a potential decrease in the number of whales using these survey areas during the summer period (especially if external recruits do not replace killed whales). The number of whales approached (117 to 131) under Alternative 6 would be about the same as under Alternatives 2 and 3, and much higher than the 40 to 58 whales expected under Alternatives 4 and 5. The number of whales subjected to harpoon attempts (7 to 8) under Alternative 6 would be about the same as under Alternative 4, about half the number expected under Alternatives 2 and 3, and much higher than the number expected under Alternative 5. As with Alternatives 2 through 5, it is likely that the number of whales would decrease, although any decrease would be about the same as under Alternative 3 because Alternative 6 would result in about the same number of PCFG whales being killed as Alternative 3 (i.e., 1.4 PCFG whales under Alternative 6 and 1.2 PCFG whales under Alternative 3). As with Alternatives 2 through 5, it is most likely that gray whales would continue using these survey areas during the summer months because: under Alternative 6, the PCFG mortality limit is more restrictive than the bycatch formula used in Alternative 2 (and the IWC analysis) by its treatment of struck and lost whales and subtraction of human-caused mortality (Table 4-1), and the IWC analysis shows that PCFG whales would remain viable with a Makah hunt; PCFG whales are dense and abundant in the OR-SVI area; PCFG whales are highly mobile within the PCFG range; there are many new and returning whales available to replace killed whales; and gray whales continue to return in large numbers to feeding areas where scores are actively hunted and killed each year (i.e., waters around Chukotka), suggesting that hunting will not cause them to abandon the PCFG feeding area.

4.4.3.6.5 Welfare of Individual Whales

As discussed in Subsection 4.1, Introduction, the number of gray whales that might be harvested from the ENP stock under all alternatives, including Alternative 6 and the No-action Alternative, would not change. It would remain at the existing IWC catch limit of 744 whales in a 6-year period and no more than 140 whales in any one year. The difference is that under the No-action Alternative, the entire catch could be taken by Chukotka Natives, while under Alternative 2 the Makah Tribe could take up to 21 whales from the 744 catch limit.

A major difference between Alternative 6 and the No-action Alternative is in the number of gray whales that might be disturbed by vessel approaches and unsuccessful harpoon attempts. Assuming that Makah hunters could embark on hunting trips during 60 days per year, it is possible that 353 gray whales might be approached per year and 21 of those whales subjected to unsuccessful harpoon attempts (Subsection 4.1.6, Alternative 6) (Table 4-12). (The number of whales approached does not include the number that might be approached by vessels other than those used by Makah hunters). Some of these whales could be subsequently encountered during a hunt by Chukotkan natives (which typically occur during the summer and fall months), so there is a greater potential for increased disturbance under Alternative 6 compared to the No-action Alternative. However, aside from struck-and-lost whales, the most severe form of disturbance—an unsuccessful harpoon attempt—would still be limited to 21 whales, which is a very small fraction (0.1 percent) of the entire ENP stock. This would result in roughly the same level of impact as Alternatives 2, 3, and 5, but approximately four times the impact expected under Alternative 4.

Like Alternatives 2 through 5, the proportion of whales struck and lost could be greater in a Makah hunt under Alternative 6 than a Chukotka Native hunt under the No-action Alternative because the Chukotka Natives have more recent hunting experience. The Chukotka Natives report that less than 3 percent of the whales struck in their hunt are lost. It is not possible to predict the proportion of whales that would be struck and lost in a Makah hunt under Alternative 6, but this alternative includes a potential of up to four whales harvested or struck and lost before the four-strike limit would be reached. The proportion of whales struck and lost under Alternative 6 could also be greater than the proportion in a Chukotka Native hunt because seasonal restrictions on the Makah hunt under Alternative 6 could result in hunts occurring in rough weather and sea conditions. Hunting under unfavorable conditions could reduce the accuracy of the hunters and make it more difficult to successfully land a killed whale (thus increasing the proportion of whales struck and lost).

Whales killed with a rifle in a Makah hunt under Alternative 6 could experience a shorter time to death than whales killed with a rifle in a Chukotka Native hunt because of the requirements proposed by the Makah (such as minimum visibility) and because the Makah would use a higher caliber killing weapon than the Chukotka Natives use. Whales killed with an explosive grenade(s) in either hunt would likely experience a similar time to death. Thus, a whale's time to death under Alternative 6 would be the same as under Alternatives 2 through 5, and the same or less compared to the No-action Alternative.

4.5 Other Wildlife

4.5.1 Introduction

This subsection addresses the potential for the six alternatives to affect wildlife species in the project area. Species analyzed in this subsection include marine mammals (other than gray whales) (refer to Subsection 4.4, Gray Whale), birds, and reptiles (i.e., sea turtles). Analyses in this subsection address all species identified in Subsection 3.5, Other Wildlife Species, that occur in the project area, including those listed as threatened or endangered under the ESA and those not listed. These analyses focuses on wildlife species that may occur in the project area and that have potential to be affected by hunt-related activities. For species that are not likely to occur near proposed hunt activities, no effects would be expected.

There are three primary sources of potential effects of whale-hunt-related activities on wildlife considered in this analysis. First are the potential direct effects related to visual and noise disturbance from anticipated concentrations of aircraft and boat traffic, and the use of guns and explosives associated with any hunt. Such disturbance may disrupt the behavior of individuals or groups of animals in the project area. Second are the potential indirect effects from visual and noise disturbance that may disrupt prey distribution or abundance, resulting in decreased foraging efficiency. Third is the potential for direct harm to marine mammals (other than gray whales) from increased vessel traffic and hunt-related activities that could cause injury or death if a marine mammal were struck by a vessel or a projectile associated with a hunt. The following subsections discuss these issues in greater detail.

4.5.2 Evaluation Criteria

We used three evaluation criteria to assess the potential direct and indirect effects of the alternatives on other wildlife species in the project area: potential changes in behavior because of disturbance (visual and noise), potential changes in prey availability, and potential for physical injury (e.g., from ship strikes or weapons).

The following subsections describe the potential for the alternatives to affect wildlife in the project area. For each alternative, the discussion addresses potential disturbance and injury and, where relevant, potential changes in prey availability. For each criterion, potential effects on marine mammals (excluding gray whales) are described first, followed by birds and reptiles (turtles). For each species group, ESA-listed endangered and threatened species are addressed first, followed by those species that are not listed. Non-listed seabirds and other birds that use coastal habitats are analyzed by habitat association, described under Subsection 3.5.3.2.2, Non-listed Birds and Their Associated Habitats. That subsection reviews the habitat types and discusses which species of birds are included in each zone. To reduce repetition, species that would probably be affected similarly under a particular evaluation criterion are addressed together.

4.5.2.1 Disturbance

Subsection 4.11, Noise, describes the sources and level of noise-related disturbance that may occur during a hunt. Subsection 3.5.3.3, Sensitivity of Wildlife to Noise and Other Disturbance, describes how wildlife species typically respond to these types and sources of noise. Many activities associated with a whale hunt would have the potential to generate noise levels that would exceed ambient levels in parts of the project area (Subsection 4.11.2.1, Noise Generated by Hunt-related Activities). Under current conditions (the No-action Alternative), noise from vehicles, marine vessels, and aircraft is commonly heard throughout the Makah U&A. Other sources of noise include commercial areas, sports fields, logging operations, and the foghorn at Tatoosh Island. Natural sounds, such as those of wind and surf, contribute to high ambient noise levels in portions of the project area, particularly in areas close to the shoreline of the Pacific coast and the Strait of Juan de Fuca. A whale hunt and associated monitoring, protests, and law enforcement would be expected to result in increased noise and human activity levels relative to levels under the No-action Alternative. In addition, firearms and other explosive devices used to strike and kill a whale would produce high-intensity, short-duration noise.

Sources of noise and visual disturbance associated with whale hunt activities include aircraft overflights (both fixed wing and helicopter), boat traffic (including both motorized and non-motorized craft), gunfire, and explosives. Anthropogenic noise can be either transient or continuous and can result in a variety of effects on wildlife with consequences ranging from none to severe (Würsig and Richardson 2002). Examples of transient noise associated with whale-hunting under the action alternatives would include helicopters, planes, and explosions; examples of continuous noise include vessels underway. The amount of noise generated by vessels and aircraft under each alternative would depend on the number of days of scouting or hunting that are likely to occur. The amount of noise produced by weapons would depend on the number of whales that may be struck and killed under a given alternative.

Among the proposed alternatives, the No-action Alternative would pose the lowest risk of disturbance to other species of wildlife. Under all of the action alternatives, the greatest potential for direct effects on other wildlife species would be from noise and visual disturbance related to increased human activity directly and indirectly associated with a whale hunt. This analysis considers the likelihood of effects on wildlife as a result of such increased disturbance.

Analyses in this subsection consider the nature and magnitude of hunt-related activities in relation to wildlife occurrence and behavior (e.g., nesting, migration, foraging, nursing, and other critical survival activities). For each species, species group, or habitat type, the analyses examine the proximity of hunt-related activities to sensitive areas (e.g., rookeries, nest sites, haulout sites). Alterations in wildlife behavior may occur if vessels or aircraft associated with hunt-related activities travel close enough to sensitive areas to disturb animals (Subsection 3.5.3.3.2, Boat Traffic, and Subsection 3.4.3.6.6, Vessel Interactions).

It is possible that the number and types of vessels and aircraft that would participate in each hunting expedition (including observation, protests, law enforcement, and media coverage) would vary among the action alternatives. For example, hunting during summer (i.e., under Alternative 4) could result in a greater number of observers overall because of an increased likelihood of more hunting occurring during periods of good weather. Conversely, alternatives that allow more hunts might attract less public interest over time and less media coverage. Because of the difficulty of predicting such variations and how they might affect the precise numbers of vessels and aircraft participating in each hunt, this analysis assumes each hunting expedition would be accompanied by the same amount of vessel and aircraft activity and associated disturbance. Vessels and aircraft associated with each hunt would likely be similar to those associated with the previous hunts, as described in Subsection 3.11.3.2.1, Atmospheric Noise. It is not possible to predict the specific location of hunt-related activity on a given day under any action alternative. The area in which hunting would be allowed would be the same among all of the action alternatives except Alternative 3, under which Makah hunters would be prohibited from making an initial strike on a gray whale within 5 miles (8 km) of shore.

4.5.2.1.1 <u>Marine Mammals (Excluding Gray Whales)</u>

As described in detail in Subsection 3.5.3.3, Sensitivity of Wildlife to Noise and Other Disturbance, marine mammals in the coastal environment (e.g., seals, sea lions, and sea otters) may react to changes in noise and human presence by altering behaviors such as breeding, nursing, grooming, foraging, or resting. The effects of such disturbance on marine mammals would be related primarily to the type, level, timing, and location of disturbance relative to species locations and activity. Animals might be disturbed at haulout sites and spend more time in the water, thereby reducing rest periods, altering nursing frequency, and modifying thermoregulation. Species that breed in the project area (i.e., harbor seals and sea otters) could be disturbed during the summer when hunt activities might disrupt pupping or breeding activities or interrupt the female/pup bond during nursing.

Whales, dolphins, and porpoises might react to increased disturbance related to a hunt by changing their swim speed or direction or increasing dive duration. The sight and sound of vessels might also disturb the foraging behavior of seals and sea lions in the water and may affect foraging and grooming behaviors of sea otters. Noise from vessels, aircraft, and weapons associated with whale hunting might disrupt the ability of predatory species (e.g., killer whales) to communicate and to locate or obtain prey. For all of these species of marine mammals, any resultant effects would likely be temporary (lasting a few minutes to a few hours) and localized (occurring near the hunt).

Subsection 4.11.2.1, Noise Generated by Hunt-related Activities, discusses the level and duration of noise anticipated from weapon use and vessel and aircraft activity associated with hunting. It is not possible to predict in advance the exact level of atmospheric or underwater noise that vessels and aircraft would produce on a typical day of hunting. Depending on the method used to kill a struck whale, the loudest noise levels associated with hunting would be from gunshots (atmospheric noise) or grenade explosions (underwater noise) (Subsection 4.11.2.1, Noise Generated by Hunt-related Activities). Noise from a gunshot would probably decay to ambient levels within 1 or 2 miles of the source (although this distance cannot be determined with certainty), while a grenade explosion underwater might not decay to ambient levels for several miles. Noise from these sources would last only a few seconds.

Overall, the number of marine mammals that would potentially occur close enough to hunting activities to be affected by the associated noise would probably be low. As presented in Table 3-16, frequency of occurrence of about half of the federal- and state-listed species of marine mammals in the project area is uncommon or rare. Nearly all of the species of marine mammals that may occur in the project area, including ESA-listed species, are wide-ranging and may travel long distances as part of their normal daily movements. Sea otters do not typically travel long distances on a daily basis but are known to travel extensively in the vicinity of the Makah U&A (Lance et al. 2004). Thus, any changes in behavior of these species because of disturbance from whale-hunt-related activities would likely be temporary and would probably not have lasting effects on individuals or populations. Noise effects specific to particular species and species groups of wildlife are discussed below.

ESA-listed Marine Mammals

Several ESA-listed species of wildlife are known to occur in the project area, but would probably not be affected by the proposed whale-hunt-related activities because of their rare to uncommon occurrence along the Washington coast and/or their use of habitats too far from shore to encounter any hunt-related activities in the project area (Table 3-16). These species include five ESA-listed species of whales (sperm, blue, sei, fin, and right). When present in Washington waters, all of these whale species typically occur in pelagic deep waters off shore in the Makah U&A beyond the bounds of where proposed hunting would likely occur. There may be brief periods during hunt-related activities, particularly as a result of aircraft activities or grenade explosions, when ESA-listed marine mammals would be exposed to increased noise levels and might modify their behavior (e.g., dive duration, swim direction, etc.) in response. Although ESA-listed species of marine mammals have a low likelihood of encountering hunt-related activities, the species that would have the highest likelihood of encountering hunt-related activities include the killer whale and humpback whale. These species are discussed in further detail below.

As mentioned above, all species of marine mammals that may occur in the project area, including ESA-listed species, are wide-ranging and may travel long distances as part of their normal daily movements. Any changes in behavior of these species because of whale-hunt-related disturbance would likely be temporary and would probably not have lasting effects.

Killer Whale

Offshore, transient, Northern Resident, and Southern Resident killer whales might occur in or near the project area year round. Of these, ESA-listed Southern Resident killer whales are the most likely to occur in the project area and may be present at any time of year (Subsection 3.5.3.1.1, ESA-listed Marine Mammal Species). Transient killer whales may also be present sporadically. The greatest number of Southern Resident killer whales was sighted in the summer in inland waters east of the Makah U&A, although recent surveys and acoustic studies have encountered them widely distributed across different habitats off the Washington coast during the winter and spring (Subsection 3.5.3.1.1, ESA-listed Marine Mammal Species). Therefore, the potential exists for killer whales to be in the vicinity of a whale hunt and thus be disturbed by the associated activities under any of the action alternatives.

As with other species of marine mammals, noise and human activity related to the use of vessels associated with whale hunting might cause killer whales to modify their behavior. As discussed in Subsection 3.5.3.1.1, ESA-listed Marine Mammal Species, listing factors for the killer whale included, among other things, noise and disturbance from vessel traffic. Killer whales may temporarily change dive duration or swim direction, for example, in response to hunt-related disturbance, particularly disturbance associated with the use of aircraft. Disturbance from vessels, aircraft, and weapons associated with whale hunting also has the potential to disrupt the ability of killer whales to communicate or find prey. Any resultant changes in behavior would be temporary, likely lasting only as long as a hunt was underway. As with other species of marine mammals that may occur in the project area, killer whales are wide-ranging and may travel long distances as part of their normal daily movements. While hunting activities were underway under any of the action alternatives, killer whales would likely be able to move to areas where no disturbance would occur.

As discussed in Subsection 3.5.3.1.1, ESA-listed Marine Mammal Species, the primary constituent elements for the Southern Resident killer whale critical habitat include 1) water quality to support growth and development; 2) prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and 3) passage conditions to allow for migration, resting, and foraging. None of the proposed alternatives would appreciably affect these elements of critical habitat for this species.

Humpback Whale

Humpback whales occur occasionally in or near the project area and might occur in the vicinity of a gray whale hunt. Noise and visual disturbance from vessels, aircraft, or weapons could thus affect humpback whales above or below the water. Potential effects would include changed swim speed or direction or increased dive duration to avoid the noise.

As mentioned above, all species of marine mammals that may occur in the project area, including humpback whales, are wide-ranging and may travel long distances as part of their normal daily movements. Thus, any changes in behavior (e.g., migration, movements, and habitat use) of these species because of whale-hunt-related activities would likely be temporary and would probably not have lasting effects.

Non-ESA-listed Cetaceans

Of the 15 non-listed species of cetaceans discussed in Subsection 3.5.3.1, Marine Mammals, 12 are rare or uncommon off the Washington coast and/or use habitats in the pelagic environment, far from the vicinity of whale-hunting activities in the project area (Table 3-16). Thus, these 12 species would probably not be affected by whale-hunt-related activities and are not considered further in this analysis. These 12 species include northern right whale dolphin, common dolphin, striped dolphin, Risso’s dolphin, false killer whale, pilot whale, pygmy sperm whale, minke whale, Baird’s beaked whale, Curvier beaked whale, Hubb’s beaked whale, and Stejneger’s beaked whale. The three exceptions are harbor porpoise, which occur in the coastal environment, and Dall’s porpoise and Pacific white-sided dolphins, which are infrequent visitors in the coastal environment. When any of these three species are present in coastal areas during a hunt, they would probably be affected by disturbance from vessels, aircraft, or weapons associated with a whale hunt. Whales, dolphins, and porpoises might react to hunt-related disturbance by changing their swim speed or direction or increasing dive duration. Noise from vessels, aircraft, and weapons associated with whale hunting might disrupt the ability of predatory species (e.g., killer whales) to communicate and to locate or obtain prey.

As mentioned above, all species of marine mammals that may occur in the project area, including the non-ESA-listed species of cetaceans, are wide-ranging and may travel long distances as part of their normal daily movements. Any changes in behavior of these species because of whale-hunt-related activities would likely be temporary and would probably not have lasting effects.

Non-ESA-listed Pinnipeds

As discussed in Subsection 3.5.3.1, Marine Mammals, six non-ESA-listed species of pinnipeds are known to occur in the project area: harbor seal, Steller sea lion, California sea lion, northern elephant seal, and northern fur seal. Of these species, only the Steller and California sea lions and harbor seals have a reasonable potential to occur in the vicinity of a hunt in the project area (Subsection 3.5.3.1.2, Common Species off the Washington Coast). Northern fur seals and northern elephant seals occur infrequently and in relatively low abundance in the project area, or they occur in the pelagic environment where they would probably not encounter whale-hunt-related activities.

Steller sea lions, California sea lions, and harbor seals are, however, common in the project area. All three species use offshore islands and rocks as haulout sites for resting (Steller and California sea lions) or to nurse pups (harbor seals). Most offshore islands and rocks in the project area are less than 1 mile (1.6 km) from the shoreline, whereas most hunting under the action alternatives would probably take place 1 mile (1.6 km) or more off shore (as was the case with previous hunts). Thus, these species' haulout sites would have a very low likelihood of being affected by hunt-related activities in the project area, although the noise associated with helicopters and gunshots in particular, would carry much farther than the immediate hunt area. Disturbance associated with the use of hunt-related vessels might occasionally disrupt pinniped foraging behavior in the project area. As with other species of marine mammals that may occur in the project area, these pinnipeds are wide-ranging and may travel long distances as part of their normal daily movements. Because pinnipeds in the project area rarely forage in large groups, and because only a minute proportion of the project area would be affected by whale hunting activities at any given time, the number of these animals that could be affected by hunt-related disturbance during a whale hunt would likely be extremely small. In addition, any associated changes in behavior would be temporary, likely lasting only as long as a hunt was underway. Most portions of the project area do not receive high levels of vessel traffic. Under any of the action alternatives, while hunting activities were underway, seals and sea lions would likely be able to find foraging opportunities in areas where no disturbance would occur. Any changes in behavior because of whale-hunt-related disturbance would likely be localized and temporary and would probably not have lasting effects. Overall, the effects of the alternatives on hauled out or foraging Steller sea lions, California sea lions, and harbor seals would probably be negligible.

Northern Sea Otter

Northern sea otters are common in the project area throughout the year and can travel extensively or shift their distribution seasonally to forage or seek more sheltered waters (Lance et al. 2004). They generally inhabit shallow coastal waters less than 1 mile (1.6 km) from shore, but they may occasionally be seen as far as 3 miles (4.8 km) off shore. Disturbance from the use of vessels, aircraft, or weapons associated with whale hunting might affect sea otters that are swimming, foraging, or grooming in or near the project area by causing them to spend time avoiding the activity and thereby reducing rest and grooming periods. Hunt-related activity and noise could also disrupt activities related to breeding, such as nursing or caring for young. Based on the low density of northern sea otters in the project area, the number of animals that could be affected by hunt-related disturbance during a whale hunt would likely be small. In addition, any associated changes in behavior would be temporary, likely lasting only as long as a hunt was underway. For these reasons, the effects of whale hunting on northern sea otters would probably be minor.

4.5.2.1.2 Other Marine Wildlife

ESA-Listed Species

Several ESA-listed species of wildlife are known to occur in the project area, including two ESA-listed species of birds (short-tailed albatross and marbled murrelet) and four species of sea turtles (leatherback, green, loggerhead, and olive ridley). Although the bald eagle was recently delisted, the species is still protected under the Bald and Golden Eagle Protection Act, and is thus addressed with the ESA-listed species below.

Short-tailed Albatross

When present in Washington waters, short-tailed albatrosses typically occur in pelagic, deep waters off shore in the Makah U&A beyond the area where proposed hunting would likely occur. There may be brief periods during hunt-related activities, particularly as a result of aircraft activities or grenade explosions, when a short-tailed albatross could be exposed to increased noise levels (compared to the No-action Alternative) and might modify its behavior in response, but the likelihood of such an encounter would be extremely low. As is the case for most marine wildlife in the project area, short-tailed albatrosses are wide-ranging and may travel long distances as part of their normal daily movements. Any changes in behavior of these species because of whale-hunt-related disturbance would likely be temporary and localized.

Marbled Murrelet

Murrelets either dive or paddle away when approached by a boat, depending on the speed of the boat. If disturbance occurs in a foraging area where murrelets congregate, the birds potentially could lose an opportunity to find a fish. It is unknown how murrelets react to gunfire, helicopters, and other loud disturbances to which these birds are unaccustomed, although helicopters and gunfire would probably cause them to either dive or fly away from the area completely (Nelson 1997). Flushing birds might stress their energy reserves, given that they have to fly long distances to bring fish to their young during the breeding season (April 1 through September 15). The time of day that the disturbance occurred might also make a difference in the degree of impacts on this species. During the breeding season, most foraging takes place during the early morning hours (Nelson 1997).

Whale hunts and associated activities under the action alternatives could disturb adult murrelets foraging at sea, potentially reducing the amount of prey brought to chicks. The likelihood of any disturbance is low, however, because hunt-related activities would occupy a small proportion of the project area at any given time. Marbled murrelets would likely be able to find foraging opportunities in areas where no disturbance would occur, although this could be more difficult for birds undergoing a 2-month molt (which occurs during the latter half of the year).

Bald Eagle

As mentioned above, although bald eagles have been removed from the ESA list of threatened species, they are given particular consideration in this analysis based on the regulatory protection afforded by the Bald and Golden Eagle Protection Act. Bald eagles are present in the project area throughout the year and they nest, roost, and forage along the coastline. Bald eagles are known to flush off nests and roost sites when people or vessels get too close, and they may be deterred from foraging in an area where many vessels congregate on the water (Stinson et al. 2001). Bald eagles are more sensitive to disturbance during the spring months when they nest. Flushing off their nests, particularly at the beginning of the breeding season, might affect the physical condition of birds or cause them to abandon a nest, which could in turn affect the ability to feed chicks. Once chicks hatch in May, there would be less likelihood of nest abandonment.

It is unlikely that any whale hunt activities would occur close to active bald eagle nests, as previous hunts have occurred 1 to 2 miles (1.6 to 3.2 km) off shore; however, the noise associated with helicopters and gunshots in particular, would carry much farther than the immediate hunt area.

Helicopters, fixed-wing aircraft, and increased human activity associated with hunt-related activities would probably alter the behavior of bald eagles that may be present in the project area during a hunt. Bald eagles flush away from nesting or foraging sites when approached by helicopters as close as 0.4 mile (0.64 km). Flushing distances are greater in the breeding season than in winter. While eagles would flush when helicopters come within 1,000 feet (304.8 m) in the winter, they would flush if helicopters would approach to within 1,500 feet (457.2 m) when on a nest (Stalmaster and Kaiser 1997). It is likely that some eagles cannot tolerate human presence and its associated noise within a particular distance of their feeding or nesting activities.

Sea Turtles

Four species of sea turtles occasionally occur along the Washington coast: leatherback, green, loggerhead, and olive ridley. Leatherback sea turtles are seldom seen in the project area, but they may migrate along the Washington coast during non-breeding years; thus, they could be found in the project area at any time. This species occasionally forages in the deep pelagic waters off the Washington coast. Rarely, leatherbacks appear in bays and estuaries, although such locations are not their preferred habitat. Green, loggerhead, and olive ridley sea turtles are found in warmer waters and only approach the Washington coast in El Niño years. All four of these species of turtles would most likely continue to forage along the Washington coast under the action alternatives, especially during warm winter years. These species of turtles are not easily disturbed during foraging activities; if approached by boats, they would most likely move slowly away from any sources of disturbance. Some short-term effects related to temporary disturbance from hunt-related activities could cause some turtles to move away from a preferred feeding area, but this would probably be temporary. As discussed in Subsection 4.3.3.2.1, Pelagic Environment, any disturbance of animals in pelagic waters would be minor (vessels are small and the area is large and highly energetic), local (limited to waters near the activity), and of short duration (minutes to hours). Based on the low likelihood of sea turtles occurring in the vicinity of hunt-related activities, as well as the minor consequences of any disturbance, none of the alternatives would be expected to result in appreciable disturbance-related effects on sea turtles. Because none of these species of turtles nests in Washington State, there would be no expected impacts from whale-hunt-related activities on the nests or nesting habitat of sea turtles.

Non-Listed Marine Birds and Their Associated Habitat

The project area includes some of the largest seabird colonies in the continental United States, with more than 100 species of birds using this area for nesting, wintering, or foraging. Analyses in this subsection focus on the six types of habitat these species use and the effects that the alternatives would have on these habitat types (i.e., beaches, bays, and estuaries; coastal headlands and islands; nearshore marine habitat; inland marine habitat; marine shelf habitat; and oceanic habitat). All six habitat types are present in the project area and are discussed individually where appropriate.

Beaches, Bays, and Estuaries

The beaches, bays, and estuaries along the Olympic coast support large numbers of marine and shorebirds for both breeding and foraging, particularly during migration. These habitat types support the highest numbers of species compared with other habitat types. Disturbance from vessels and aircraft that pass near beaches, bays, and estuaries may have short-term effects on breeding colonies and migrating birds that use these habitat types. Gunfire and helicopter noise is particularly likely to flush birds off nests if it occurs close to shore where these birds are nesting or if they are foraging just off shore. Additionally, noise from powerboats that approach the shore could cause birds that are unaccustomed to this activity to temporarily flush off nests. If disturbance occurred during the breeding season (generally spring and summer), some nest abandonment might occur. It is difficult to determine what impact this type of direct short-term effect would have on the long-term productivity of populations as a whole, although it might be a negligible loss.

Potential disturbance of individual pairs of nesting birds that happened to be close to a whale butchering site on the shore could cause loss of that year's chicks. Any harvested whale would probably be brought to a beach on the Makah Reservation, so nesting colonies (and migrating aggregations) on the reservation would face the greatest risk of disturbance and displacement under the action alternatives. That risk would be associated primarily with the number of whales harvested.

As mentioned in Subsection 3.5.3.2.2, Non-listed Birds and Their Associated Habitats, human-made structures, such as jetties, pilings, and buoys, provide important roosting habitat for cormorants, gulls, and other birds. None of the proposed alternatives would alter any existing human-made structures, or result in the construction of new ones, that may be used by these species for roosting.

Coastal Headlands and Islands

Large numbers of ledge-nesting birds inhabit offshore rocks and islands in the project area. Coastal headlands and islands provide critical nesting, foraging, and overwinter migratory habitat for these species. Species of ledge-nesting birds in the project area may be easily flushed off nest sites, leading to abandonment, predation on eggs or chicks, and subsequent nest failure. In addition, raptors, passerines, and other marine birds also use these habitat types. Noise associated with hunt activities, should hunting occur close to the headlands and islands, could potentially flush birds off nest sites, similar to the short- and long-term impacts discussed above under Beaches, Bays, and Estuaries. The potential for ledge-nesting species of birds to be affected by whale-hunt-related activities in the project area, and the degree of effect, would depend largely on the timing and proximity of any potential hunt-related disturbance. The potential for such disturbance and impacts to these species would depend on the number of days with hunt-related activities, the season in which those activities occur (with activities during the summer breeding season posing a greater risk of disturbance than activities during winter) and the location of the activities (with activities farther off shore posing a smaller risk of disturbance than activities closer to shore).

Nearshore and Inland Marine Habitats

Birds in the project area use the nearshore marine habitat primarily for foraging. A variety of common marine birds also use this area as a migration corridor. Species richness and bird abundance are greatest in winter, although some seabirds may concentrate in large numbers during the summer. Species richness is relatively low in inland marine waters, with richness and bird densities higher in winter than summer. Most species found in this area forage in the winter or during migration.

Nearshore marine habitat is one of the zones where whale hunting could occur under the action alternatives. The nearshore zone occurs mostly within 1 mile (1.6 km) of the shoreline. As with the previous hunts, most hunting under the action alternatives would probably take place 1 mile (1.6 km) or more off shore. Noise from vessels and aircraft, gunfire, and other hunt-related activities would probably not be as intense as in the continental shelf zone farther off shore. The potential for hunt-related activities to result in disturbance of birds using nearshore marine habitats, therefore, would be relatively low compared to the potential for disturbance in habitats farther off shore. Whale hunting that is directed at whales during the summer (i.e., under Alternative 4), however, would likely target whales that are feeding in the project area and may therefore take place closer to shore than hunting during winter or spring, which may target migrating whales further off shore.

Vessel noise and human activity associated with hunt activities would displace foraging birds. When a whale is harpooned, all birds foraging within a few hundred feet of the whale hunt would probably flush in response to the sounds of gunfire, helicopters, or other loud devices. Interrupted foraging might lead to increased stress on birds' metabolism, but the short-term impacts would be temporary and localized while long-term effects on the populations as a whole would be difficult to determine (relative to the No-action Alternative).

Marine Shelf Habitat

This zone provides foraging habitat and a migration corridor for a variety of marine birds, primarily during winter and during late summer/early fall when both residents and migrants are numerous.

Because bird densities are lower in this habitat type, any risks to foraging and migrating birds is also lower, compared to other zones closer to shore.

Much of this zone is 1 mile (1.6 km) or more off shore, which corresponds with the area where most hunting under the action alternatives would probably take place (as was the case with previous hunts). Because the density of birds in this zone is lower than in areas closer to shore, and because no breeding or roosting occurs in this zone, the risk of disturbance would be lower than the risk in nearshore zones.

Oceanic Habitat

The continental shelf hosts the lowest species richness among the habitat types considered in this analysis and is limited to foraging birds as they migrate or residents that forage in deep waters. Species associated with this zone are primarily gulls and terns. This area is approximately 9 miles (14.5 km) off shore (Buchanan et al. 2001), and fewer bird species use this zone than other habitat types closer to shore. It is likely that hunt-related activities under any of the action alternatives would occur closer to shore (i.e., approximately 5 miles (8 km) from shore under Alternative 3 and within 1 to 2 miles (1.6 to 3.2 km) from shore under the other action alternatives). For these reasons, it is likely that any effects of whale hunting on foraging and migrating birds that use these deep ocean waters would be negligible.

4.5.2.2 Prey Availability

Transient killer whales consume gray whales. The analysis considers the likelihood and significance of reduced abundance or availability of prey for foraging killer whales. Under the action alternatives, the abundance of gray whales in the project area could decrease because of hunting or movement out of the area in response to noise and human presence. Such decreases might reduce the abundance or availability of prey for killer whales, causing them to spend more time foraging and thereby increasing the risk of compromised health. The potential for hunt-related activities under each alternative to result in reduced abundance or availability of prey for foraging killer whales would depend on the number whales likely killed under each alternative and the amount of disturbance likely to occur under each alternative, which in turn would depend on the number of days that scouting or hunting are likely to occur.

Regardless of the number of whales killed or the amount of disturbance that would likely occur under any of the action alternatives, the loss of potential prey to killer whales because of removal of gray whales is unlikely to have individual or population-level effects on killer whales in the project area. The endangered Southern Resident killer whales eat fish and do not consume gray whales (or other marine mammals). Gray whales account for only 8 percent of observed predation by transient killer whales on marine mammals on the west coast of North America, and calves and juveniles make up the bulk of the gray whales taken (Wade et al. 2006). Gray whales are also abundant in the project area. Thus, removal of a maximum of seven adult gray whales per year by whale hunters under the action alternatives is unlikely to affect the prey base of killer whales in the project area. As noted in Subsection 4.4.2.4, Change in Numbers of Gray Whales in the Makah U&A and OR-SVI Areas, it is likely that gray whales would not abandon the Makah U&A or other areas in the PCFG range as a result of limited hunt-related activity.

It is unlikely that any of the action alternatives would affect prey availability for other marine mammals, birds, or sea turtles through disturbance to the food chain (Subsection 4.3, Marine Habitat and Species). Any disturbance of prey species would probably be temporary and localized. Because of the low likelihood of prey-related effects, potential effects on species other than killer whales are not discussed further.

4.5.2.3 Potential Injury

The analysis considers the likelihood of injury to cetaceans, pinnipeds, sea otters, and sea turtles as a result of being struck by a vessel or impacts associated with a projectile (harpoon, bullet, or grenade) used during the hunt (as measured by the amount of whale hunting activity). It is extremely unlikely that birds would sustain injury from vessels or weapons used in a whale hunt. Any birds that might be near an area where a hunt was underway would almost certainly flush from the area. This analysis, therefore, addresses potential effects on marine mammals or turtles. The risk of injury would depend primarily on the amount of hunt-related vessel traffic in the project area (including Makah vessels and associated protest, media, and law enforcement vessels), which would depend on the number of days with hunt-related trips. Increased levels of vessel activity associated with whale hunting under the action alternatives (compared to the No-action Alternative) would result in an increased risk of animals being struck and injured. For the reasons discussed below, the risk of weapons-related injuries would be extremely small.

4.5.2.3.1 Marine Mammals

Under all of the action alternatives, the potential for any marine mammals to be struck by projectiles would be remote and would be possible only if another animal were mistaken for a gray whale or were immediately adjacent to a gray whale during a strike attempt. Some larger whale species could be mistaken for a gray whale during offshore hunt activities because of similar size. Makah whalers would, however, likely be able to distinguish other species from gray whales because of the characteristic blow of each species, skin color, position of the dorsal fin, behavior, and other characteristics that the whalers are trained to identify. Additionally, the Tribe’s proposal includes safety measures before firing a weapon. Examples are minimum visibility and a signal from the lookout.

Implementation of these measures would ensure a greater likelihood of positively identifying a gray whale before attempting a strike. Therefore, there is a very low likelihood that marine mammals other than the target species (gray whales) would be struck by projectiles used during a whale hunt under the action alternatives.

Any killer whales that occur near gray whales would most likely be transients surveying the gray whales as possible prey. The killer whales would most likely associate only with female gray whales with calves, focusing on the calves as prey. Under all of the action alternatives, no strikes would be allowed on calves or adults accompanied by calves. Killer whales would probably not be near gray whales targeted by whale-hunt activities because of the age and size of the targeted whales. Makah whalers would probably not mistake a killer whale for a gray whale, and killer whales would most likely not remain close enough to whale hunting activities to be hit by an errant harpoon or projectile. For these reasons, the chances of a killer whale being struck by a harpoon or projectile during a hunt would be negligible.

There is a slight possibility that a marine mammal other than a gray whale could be injured by a vessel or an errant projectile associated with the hunt. Other marine mammals do not swim close to gray whales, except transient killer whales that may be preying on gray whales, as mentioned above. For this reason, along with the safety measures the Tribe has proposed (Subsection 2.3.2.2.12, Other Environmental Protection Measures; Public Safety Measures and Enforcement), the chances that a harpoon or errant projectile might strike marine mammals other than killer whales are considered negligible and are, therefore, not discussed further.

It is unlikely that hunt-related activities could result in injury to marine mammals as a result of a ship (vessel) strike or propeller injury. As discussed in Subsection 3.4.3.6.8, Ship Strikes, ships at least 263 feet (80.2 m) long that travel at least 14 knots cause most of the lethal or severe injuries to whales. Vessels engaged in a hunt and associated activities would be much smaller. The largest vessel involved in the previous hunts was the 95-foot (29-m) protest vessel M/V *Sirenian*, which remained in Neah Bay during most hunt activities. Vessels engaged in and monitoring the hunt would travel mostly at the rate of the human-powered canoe for all action alternatives except Alternative 3, which would involve a motorized hunt vessel, although law enforcement vessels might have to move more rapidly to intercept protest vessels violating the MEZ.

Because of their keen acoustic capabilities, killer whales would be aware of vessels in the area and would likely move away before the vessels were close enough to cause injury. Killer whales are adept, proficient swimmers, and they would most likely avoid vessels associated with the hunt. Other marine mammals, including seals, sea lions, and cetaceans (with the possible exception of gray whales), are also adept, fast swimmers that tend to avoid moving vessels. If they were in the path of a moving vessel, they would likely dive below and away from the vessel and out of harm's way. Sea otters are relatively slow swimmers (compared to pinnipeds) and might approach vessels when near shore. However, any sea otters near hunt activities would probably swim rapidly away or dive below and away from oncoming vessels.

4.5.2.3.2 Sea Turtles

Sea turtles are slow swimmers and are susceptible to collision with fast-moving vessels. Under the action alternatives, whale hunts and associated activities would result in temporary and localized increases in the number of fast-moving vessels in the vicinity of a whale hunt in the project area. Chase boats engaged in a whale hunt, as well as protest vessels and law enforcement vessels, could inadvertently strike a turtle as it surfaced for air, causing injury or death. The potential for injury to sea turtles as a result of vessel strikes associated with a hunt would be extremely low, however, because of the low abundance of these species throughout their range, including the project area. Leatherback turtles would have a higher likelihood of encountering vessels than the other species (green, loggerhead, and olive ridley) that are strictly warmer water species found only infrequently off the Washington coast. Given the highly endangered status of this species, the loss of even one leatherback turtle in this manner could hinder recovery efforts. However, given that leatherback turtles only rarely occur off the coast of Washington, the likelihood of such incidents would be negligible.

4.5.3 Evaluation of Alternatives

The effects of the six alternatives would differ among individual species and species groups (including those identified by habitat association) depending on their use of and occurrence in the project area. For example, hunt-related activities under the action alternatives would more likely affect certain pinnipeds than most cetaceans (except gray whales), given characteristics of their foraging behavior and distribution in the project area. Pelagic species (e.g., sperm whales, leatherback turtles) would less likely be affected by the action alternatives than those that commonly occur in the coastal environment (e.g., harbor seals, bald eagles). Among pinnipeds, harbor seals and California sea lions use haulout sites in the project area (Subsection 4.5.2.1.1, Marine Mammals (Excluding Gray Whales)). Those species would, therefore, more likely experience effects of hunt-related activities than elephant seals or fur seals, which do not breed or haul out in the area.

The potential for hunt activity to result in disturbance, reduced prey availability, or injury to wildlife would depend on the timing of the hunt, the location of the hunt, and the number of days with hunt-related trips. Hunting that takes place at a time when a species is present (particularly breeding) in the project area would have a higher likelihood of affecting that species than hunting that takes place when the species is not present in the project area. In addition, hunting that takes place farther off shore (as under Alternative 3) would have a lower likelihood of affecting species that are present on the rocks and islands closer to shore. The more days of hunting that occur, the more potential there is for effects on wildlife. As mentioned above, this analysis assumes that the amount of hunt-related activity would be the same on any given day of a hunt. Thus, each day of hunting during a given season would present the same potential for effects on wildlife.

4.5.3.1 Alternative 1, No Action

Under the No-action Alternative, no whale hunt would be permitted, and no whale hunting or associated activities (e.g., monitoring, protests, and law enforcement) would be expected to occur. Levels of noise and human presence in the project area would vary with time and location, but would probably not exceed current levels under this alternative. Similarly, under the No-action Alternative, neither prey availability nor the risk of injury or death from collision or projectiles would likely change from current conditions.

Trends in the status of health, abundance, and habitat conditions for wildlife species would continue through state and federal conservation efforts pursuant to the ESA, MMPA, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act. Prohibitions on take under these statutes would continue and would require permits from NMFS and USFWS. In the case of take permits issued under the ESA and MMPA, such permits would be subject to public review. For all species (listed and non-listed), direct mortality from anthropogenic sources would probably remain at current levels. Natural mortality from predation, disease, and other sources would most likely match current levels.

Some marine mammals, specifically those in the coastal environment (e.g., harbor seals, California sea lions, Steller sea lions, and sea otters), and most birds and turtles would continue to encounter noise and vessel traffic from sport and commercial fisheries vessels, sight-seeing boats, and other sources such as military vessels. Effects on these species at current levels are unknown.

Availability of gray whales as prey to transient killer whales would continue to be variable as the gray whale population naturally fluctuates. The timing and magnitude of killer whale foraging efforts on gray whales would probably not change from current trends under this alternative. The prey base for other species (e.g., other cetaceans, pinnipeds, sea otters, and birds) would continue to vary as a result of natural events and human perturbations such as fishing. Ongoing variations in prey abundance would have varying effects on individual species.

A small number of marine mammals in the coastal environment would continue to be exposed to vessel traffic. This might result in vessel strikes from commercial and recreational vessels. Turtles, which are slower swimmers, may be more susceptible than other species to vessel strikes. Implementation of the No-action Alternative would not result in any increase in current low levels of injury as a result of ship strikes.

4.5.3.2 Alternative 2, Tribe's Proposed Action

Under Alternative 2, hunt-related trips would likely occur on approximately 60 days from December through May each year, primarily during April and May. An average of four whales could be harvested per year, with no more than five harvested in a single year. No more than seven whales could be struck per year. Based on estimates of the number of rifle shots or grenade explosions per whale harvested, Alternative 2 would be likely result in as many as 64 rifle shots or 12 grenade explosions annually (Subsection 4.1.2.5, Potential Number of Shots Fired or Grenade Explosions).

As part of this alternative, the Tribe would not approach within 200 yards (183 km) of Tatoosh Island or White Rock during May to minimize disturbance to feeding and nesting seabirds. No hunting would occur from June 1 through November 30, additionally protecting nesting seabirds during the fledging and post-fledging period. Subsection 4.5.2.1, Disturbance, describes the amount of vessel and aircraft activity expected to occur on any given day of hunting.

4.5.3.2.1 Marine Mammals

Under Alternative 2, changes in disturbance levels, prey availability, and the potential for physical injury on approximately 60 days per year with hunt-related trips could lead to an increased risk to marine mammals other than gray whales, compared to the No-action Alternative (effects on gray whales are addressed in Subsection 4.4, ENP Gray Whale). The greatest potential for effects would be from vessel and noise disturbance. For all marine mammals addressed in this analysis, these effects would be as described in Subsection 4.5.2.1.1, Marine Mammals (Excluding Gray Whales). The intensity of the effects would depend on the number of occasions on which such disturbance occurred (related to the number of days of hunting) and the portion of the animals' life history during which they occurred (hunt timing). Any effects would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring close to the hunt), and would probably not have lasting deleterious effects on individuals or populations. For all species, the number of animals close enough to hunting activities to be disturbed would likely be low.

As discussed in Subsection 4.5.2.2, Prey Availability, the potential for whale hunting activities under Alternative 2 to affect prey availability for killer whales would be minimal, as gray whales are generally abundant in the project area, and hunting regulations would prohibit the killing of calves, the primary target of killer whales. Any marine mammals in the immediate vicinity of a gray whale during a strike attempt could be exposed to an elevated risk of injury associated with as many as 64 rifle shots or 12 grenade explosions annually. As discussed in Subsection 4.5.2.3, Potential Injury, the likelihood that any marine mammals might sustain an injury from a vessel or errant projectile would be extremely remote.

4.5.3.2.2 Other Marine Wildlife

Under Alternative 2, effects associated with whale-hunt activities could lead to an increased risk to birds and turtles compared to the No-action Alternative. The greatest potential for effects on most species would be from vessel and noise disturbance, as described in Subsection 4.5.2.1.2, Other Marine Wildlife. Such effects would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring near the hunt). For all species, the number of animals close enough to hunting activities to be affected by disturbance would most likely be low. Any disturbance would be localized and of short duration and would probably not cause lasting deleterious effects for individuals or populations. As discussed in Subsection 4.5.2.3, Potential Injury, the likelihood that any sea turtles might sustain an injury from a vessel or errant projectile would be extremely remote. The following discussions provide additional information about the potential effects of Alternative 2 on bald eagles and marbled murrelets, followed by an analysis of the potential effects on other species and their associated habitats. Bald eagles and marbled murrelets are addressed individually because they have a regulatory status indicating heightened management concern (i.e., listing status under the ESA or the Bald and Golden Eagle Protection Act) and more than a minimal likelihood of being affected by whale hunting activities.

Bald Eagle

Most whale hunting under Alternative 2 would likely occur during April and May, coinciding with the early portion of the breeding season for bald eagles and leading to increased risks over the No-action Alternative. If any eagles were disturbed and flushed from their nests, they might abandon their nests, particularly if the disturbance occurs before chicks hatch in May, resulting in loss of that year’s chicks. However, most hunt-related activities would occur 1 to 2 miles (1.6 to 3.2 km) off shore and would thus be unlikely to disturb eagles at active nests.

Marbled Murrelet

Under Alternative 2, there could be an increased risk to marbled murrelets compared to the No-action Alternative. Hunting during April and May would have the potential to disturb adult murrelets foraging at sea, potentially reducing the amount of prey brought to chicks. Pre-breeding behaviors such as courtship and pair-bonding may also be affected during this period. The likelihood of any disturbance would be low, however, because hunt-related activities would occupy a small proportion of the project area at any given time. Marbled murrelets would likely be able to find foraging opportunities in areas where no disturbance would occur. In addition, there would be no potential for hunt-related disturbance during most of the breeding season, which extends from April 1 through September 15.

Non-Listed Marine Birds and Their Associated Habitats

Under Alternative 2, changes in noise and activity levels on approximately 60 days with hunt-related trips could result in the disturbance of birds in the project area. Some hunts could occur during winter and during the spring migratory period, when large numbers of marine birds use beaches, bays, and entrances to estuaries. Hunts during the spring months could also result in disturbance of birds that are nesting on most coastal headlands and islands. The exceptions would be Tatoosh Island and White Rock; tribal hunters would be prohibited from approaching within 200 yards (183 km) of those locations during May to minimize disturbance of feeding and nesting seabirds during the breeding season.

Compared to the No-action Alternative, Alternative 2 would result in a greater potential for disturbance to breeding, roosting, and migrating birds. Depending on the severity of the effects, some birds' nesting attempts could fail. The potential for such occurrences to result in long-term effects on local populations of species that breed in the project area cannot be determined with certainty. On one hand, many individuals may already be acclimated to a high level of human disturbance, especially in the northern portion of the Makah U&A (e.g., approximately 25,000 to 47,000 annual angler trips out of Neah Bay (Table 3-28), along with other commercial and recreational vessel and aircraft traffic). On the other hand, the levels of noise and human activity associated with harpooning, securing, and dispatching a whale would be greater at that particular site than the largely transient activities that occur under current conditions (and that would be expected to continue under the No-action Alternative).

4.5.3.3 Alternative 3, Offshore Hunt

Alternative 3 would include the same hunting season and the same limits on the number of whales harvested as Alternative 2, but would prohibit Makah hunters from making an initial strike on a gray whale within 5 miles (8 km) of shore. Alternative 3 would not include an explicit prohibition on approaching within 200 yards (183 m) of Tatoosh Island or White Rock because both of these islands are far less than 5 miles (8 km) off shore and therefore fall well within the area where most hunt-related activities would not be expected to occur. As under Alternative 2, vessel and aircraft noise associated with hunt-related trips under Alternative 3 would likely occur on approximately 60 days from December through May each year, mostly during April and May, and there would be as many as 64 rifle shots or 12 grenade explosions annually.

Based on the similarities between the two alternatives, Alternative 3 would be expected to have a similar potential as Alternative 2 for increased risks to birds, turtles, and marine mammals other than gray whales, compared to the No-action Alternative. The increased risks would primarily be associated with changes in disturbance levels on approximately 60 days with hunt-related trips.

Compared to Alternative 2, the restrictions under Alternative 3 on hunting activities within 5 miles (8 km) of shore would be expected to reduce the potential for disturbance or injury of wildlife species during a whale hunt. Possible adverse effects on marine mammals, seabirds, and turtles foraging in sanctuary and refuge waters or using refuge lands for resting or breeding would be reduced as a result of the prohibition on making an initial strike on a gray whale within 5 miles (8 km) of shore. All of the locations in the project area that are used by wildlife at periods of elevated sensitivity to disturbance (e.g., nesting areas, haulouts) are associated with landscape features (e.g., coastal headlands, islands) that are less than 5 miles (8 km) from shore (Subsection 3.5.3, Existing Conditions). Because less hunt-related activity would occur within 5 miles (8 km) of shore, the increased potential for adverse effects on wildlife under Alternative 3, compared to the No-action Alternative, would therefore be similar to, but slightly less than, the increased potential under Alternative 2.

Hunting in areas more than 5 miles (8 km) off shore would not be expected to increase the risk of disturbance to any wildlife species that would not otherwise be exposed to hunting activities closer to shore. Nearly all of the cetacean species identified in Subsection 3.5.3.1, Marine Mammals, typically occur in continental slope waters and further off shore, beyond where proposed hunting would likely occur. Safety considerations and logistical constraints would likely keep hunting vessels as close as possible to the 5-mile (8-km) limit, whereas continental slope and deeper offshore waters occur beyond the continental shelf, which is generally 15 to 40 miles (24.1 to 64.4 km) wide in the project area (Subsection 3.3.3.2.1, Physical Features and Processes). Of the species that are more likely to occur closer to shore (including porpoises, seals, sea lions, sea otters, birds, and sea turtles, as well as some whales), none would be expected to occur in greater densities 5 miles (8 km) off shore than in waters 1 to 2 miles (1.6 to 3.2 km) off shore (i.e., the area where most hunt-related activities would be expected to occur under the other action alternatives).

4.5.3.3.1 Marine Mammals

Under Alternative 3, hunting activities would occur off shore and beyond the range of pinniped haulouts. Therefore, it is expected that Alternative 3 would have less risk of disturbing pinnipeds than Alternative 2, while both alternatives would have increased disturbance risks compared to the No-action Alternative. The increased risks would primarily be associated with changes in disturbance levels on approximately 60 days with hunt-related trips. As under Alternative 2, the potential for whale hunting activities to affect prey availability for killer whales would be minimal, as gray whales are generally abundant in the project area and hunting regulations would prohibit the killing of calves, the primary target of killer whales. Similarly, for the reasons identified in Subsection 4.5.2.3, Potential Injury, the likelihood that any marine mammals might sustain an injury from a vessel or errant projectile would be extremely remote. As discussed previously in the overall analysis of the effects of Alternative 3 on wildlife, restrictions on hunting activities within 5 miles (8 km) of shore would be expected to reduce the potential for disturbance or injury of marine mammals other than gray whales during a whale hunt, compared to Alternative 2.

4.5.3.3.2 Other Marine Wildlife

Under Alternative 3, hunting activities would occur off shore and beyond the range of seabird roosting sites and rookeries. Therefore, is expected that Alternative 3 would have less risk of disturbing seabirds than Alternative 2, while both alternatives would have increased disturbance risks compared to the No-action Alternative. The increased risks would primarily be associated with changes in disturbance levels on approximately 60 days with hunt-related trips. As discussed in Subsection 4.5.2.3, Potential Injury, the likelihood that any sea turtles might sustain an injury from a vessel or errant projectile would be extremely remote.

As discussed previously in the overall analysis of the effects of Alternative 3 on wildlife, restrictions on hunting activities within 5 miles (8 km) of shore would be expected to reduce the potential for disturbance or injury of birds and sea turtles during a whale hunt, compared to Alternative 2. Nesting areas, where birds (including bald eagles) would be most sensitive to disturbance, are located along the coastline and on offshore rocks and islands and are less than 5 miles (8 km) from shore. As discussed in Subsection 3.5.3.2.1, ESA-Listed Species and Designated Critical Habitat, only a small proportion of the marbled murrelets observed in the project area have been found more than 2 miles (3.2 km) from shore.

4.5.3.4 Alternative 4, Summer/Fall Hunt

Under Alternative 4, the hunting season would extend from June 1 through November 30 instead of December through May. As under Alternative 2, the Tribe would not approach within 200 yards (183 km) of Tatoosh Island or White Rock; this restriction would remain in effect during the entire hunting season (June through November). The maximum number of whales harvested under current conditions would be limited to one ENP male whale per year. Based on the expectation that locating and striking a known ENP male would take no more than 7 days (Subsection 4.1.4, Alternative 4), vessel and aircraft noise associated with hunt-related trips would be likely to occur on approximately 7 days per year. Alternative 4 may result in as many as 16 rifle shots or 3 grenade explosions annually, although those values could be much lower if tribal hunters are unable to locate and strike a known ENP male or if a whale is struck and lost (in which case the hunt would be ended for the year).

Compared to the No-action Alternative, therefore, Alternative 4 would result in increased risks to birds, turtles, and marine mammals other than gray whales, compared to the No-action Alternative. The increased risks would primarily be associated with changes in disturbance levels on approximately 7 days with hunt-related trips. As under Alternatives 2 and 3, the potential for whale hunting activities to affect prey availability for killer whales would be minimal, as gray whales are generally abundant in the project area and hunting regulations would prohibit the killing of calves, the primary target of killer whales. Similarly, for the reasons identified in Subsection 4.5.2.3, Potential Injury, the likelihood that any marine mammals or sea turtles might sustain an injury from a vessel or errant projectile would be extremely remote.

In contrast to the other action alternatives, whale hunting under Alternative 4 could take place during the summer and fall months when many species in the project area are engaged in activities associated with breeding, such as nesting, incubating, or feeding young. In addition, whale hunting that is directed at PCFG whales would likely target whales that are feeding in the project area and may therefore take place closer to shore than hunting under the other action alternatives, which would more likely target migrating whales further off shore. Compared to the other action alternatives, therefore, Alternative 4 would result in a smaller increase, relative to the No-action Alternative, in the number of occasions on which hunt-related activities could result in increased risks to wildlife, but a greater potential for each occasion to disrupt key activities such as breeding.

4.5.3.4.1 Marine Mammals

Similar to the other action alternatives, Alternative 4 would be expected to have the potential for increased risks to marine mammals, compared to the No-action Alternative. The increased risks would primarily be associated with changes in disturbance levels on approximately 7 days with hunt-related trips each year.

As under Alternative 2, the potential for whale hunting activities to affect prey availability for killer whales would be minimal, as gray whales are generally abundant in the project area and hunting regulations would prohibit the killing of calves, the primary target of killer whales. Similarly, for the reasons identified in Subsection 4.5.2.3, Potential Injury, the likelihood that any marine mammals might sustain an injury from a vessel or errant projectile would be extremely remote.

To a large extent, the effects associated with each hunt-related trip would be as described in Subsection 4.5.2.1.1, Marine Mammals (Excluding Gray Whales). The potential for hunt-related activities to disturb Steller sea lions or California sea lions would be greater than under Alternatives 2 and 3, because gray whale distributions during the summer and fall are nearshore and often in proximity to sea lion haulouts. The hunt-related activities may also have a greater potential to adversely affect harbor seals because harbor seals use coastal islands and rocks in the project area for breeding-related activities such as pupping and nursing. Noise and human activity associated with a hunt would have the potential to disrupt these activities. As noted previously, however, the number of animals close enough to be affected by hunting activities would probably be low. For these reasons, as under Alternatives 2 and 3, any effects would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring close to the hunt), and would probably not have lasting deleterious effects on individuals or populations.

4.5.3.4.2 <u>Other Marine Wildlife</u>

Similar to the other action alternatives, Alternative 4 would be expected to have the potential for increased risks to birds and sea turtles, compared to the No-action Alternative. The increased risks would primarily be associated with changes in disturbance levels on approximately 7 days with hunt-related trips each year. Disturbance-related effects would be as described in Subsection 4.5.2.1.2, Other Marine Wildlife, and would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring only near the hunt). As discussed in Subsection 4.5.2.3, Potential Injury, the likelihood that any sea turtles might sustain an injury from a vessel or errant projectile would be extremely remote. The following discussions provide additional information about the potential effects of Alternative 4 on bald eagles and marbled murrelets, followed by an analysis of the potential effects on other species and their associated habitats.

Bald Eagle

Whale hunting under Alternative 4 would occur after May, meaning some hunt-related activities would coincide with the fledging period for bald eagles (after chicks hatch in May), leading to an increased risk of disturbance to pre-fledging chicks, compared to the No-action Alternative. The risk of nest abandonment would be lower than under the other action alternatives, however, because bald eagles are less likely to abandon nests during the latter portion of the nesting season (Subsection 4.5.2.1.2, Other Marine Wildlife).

Whale hunting under Alternative 4 would likely target whales that are feeding in the project area, and may therefore take place closer to shore than hunting under the other action alternatives. As a result, hunt-related activities may have a greater potential to disturb bald eagles at active nests on shore, compared to the other action alternatives. Because bald eagle nesting territories are generally widely spaced, the number of eagle nests that could be subjected to disturbance from any given hunt-related trip would likely be low. For these reasons, as under Alternatives 2 and 3, any effects of Alternative 4 on bald eagles would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring close to the hunt) and would probably not have lasting deleterious effects on individuals or populations.

Marbled Murrelet

Whale hunting under Alternative 4 would overlap with a substantial portion of the breeding season for marbled murrelets. The breeding season extends from April through mid-September; most hunting under Alternative 4 would be expected to take place during the months of June through September, when the risk of encountering adverse weather and sea conditions would be lowest. Therefore, compared to the other action alternatives and relative to the No-action Alternative, hunt-related activities may have a greater increase in the likelihood of disturbing foraging murrelets, potentially reducing the amount of prey brought to chicks. The likelihood of disturbance would be low, however, because hunt-related activities would occupy a small proportion of the project area at any given time and occur on 7 days per year at most. Marbled murrelets would likely be able to find foraging opportunities in areas where no disturbance would occur, although this could be more difficult for birds undergoing a 2-month molt (which occurs during the latter half of the year).

Non-listed Marine Birds and Their Associated Habitat

Under Alternative 4, changes in noise and activity levels on approximately 7 days with hunt-related trips could result in the disturbance of birds in the project area. Most hunt-related activities would likely occur during the months of June, July, and August when many birds nest, roost, and forage on and around coastal headlands and islands. Compared to the No-action Alternative, Alternative 4 would result in a greater potential for disturbance to breeding, roosting, and foraging birds. Depending on the severity of the effects, some birds' nesting attempts could fail. As under Alternatives 2 and 3, the potential for such occurrences to result in long-term effects on local populations of species that breed in the project area cannot be determined with certainty. Compared to the other action alternatives, Alternative 4 would result in a smaller increase, relative to the No-action Alternative, in the number of occasions on which hunt-related activities would result in increased risks to marine birds, but a greater potential for each occasion to disrupt key activities.

4.5.3.5 Alternative 5, Split-season Hunt

Under Alternative 5, the hunting season would be 3 weeks in December and 3 weeks in May, in contrast to the 6-month-long hunting seasons under the other action alternatives. In addition, the landing of a single PCFG whale, or the striking and losing of a single whale, would end the hunt for any given year. Based on the constraints imposed by the hunting season and the PCFG mortality limit, it is expected that the Tribe would harvest up to one whale per year (Subsection 4.1.5, Alternative 5). As under Alternative 2, the Tribe would not approach within 200 yards (183 m) of Tatoosh Island or White Rock during May to minimize disturbance to feeding and nesting seabirds.

Based on the length of the hunting season, hunt-related trips would likely occur on approximately 22 days in May and December each year, mostly during May. This could decrease to 0 days in years when the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale. Based on estimates of the number of rifle shots or grenade explosions per whale harvested, Alternative 5 would likely result in as many as 16 rifle shots or 3 grenade explosions annually, or as few as 0 rifle shots and grenade explosions during years in which the hunt is on hiatus.

Alternative 5 would be expected to result in an increase, relative to the No-action Alternative, in risks to marine mammals, birds, and sea turtles. The increased risks would primarily be associated with changes in disturbance levels on approximately 22 days with hunt-related trips. As under Alternatives 2 and 3, the potential for whale hunting activities to affect prey availability for killer whales would be minimal, as gray whales are generally abundant in the project area and hunting regulations would prohibit the killing of calves, the primary target of killer whales. Similarly, for the reasons identified in Subsection 4.5.2.3, Potential Injury, the likelihood that any marine mammals or sea turtles might sustain an injury from a vessel or errant projectile would be extremely remote.

Alternative 5 would include the same restrictions on hunt location as Alternative 2. The potential for any given hunt-related trip to result in adverse effects on birds, turtles, or marine mammals other than gray whales would, therefore, be the same as under Alternative 2. For this reason, this analysis considers the effects on marine mammals and on all other marine wildlife species together. Based on the anticipated number of hunt-related trips (22 under Alternative 5 compared to 60 under Alternatives 2 and 3), Alternative 5 would have an overall lower potential for adverse effects on wildlife than Alternatives 2 and 3. The potential for each trip to disturb wildlife species would likely be higher than under Alternative 3 because most hunt-related activity would occur within 5 miles (8 km) of shore, where the activity would have a greater likelihood of being audible or visible at sensitive locations such as nesting areas or haulouts. Compared to Alternative 4 (under which hunting would be allowed during the summer breeding season for many species), hunt-related activities under Alternative 5 would have a lower potential to disrupt key activities such as breeding because hunting would occur only during the months of December and May.

4.5.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Under Alternative 6, the waiver and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

Alternative 6 would include the same provisions as Alternative 2 regarding the hunt area (including the restriction on approaching within 200 yards (183 m) of Tatoosh Island or White Rock during May), season, and methods and would, therefore, result in the same number of hunt-related trips with the same potential for each trip to result in adverse effects on wildlife. Alternative 6 would include greater restrictions than Alternative 2 on the maximum number of whales that could be killed per year and per 2 years. Based on estimates of the number of rifle shots or grenade explosions per whale harvested, Alternative 6 would likely result in as many as 56 rifle shots or 11 grenade explosions annually.

Alternative 6 would be expected to result in an increase, relative to the No-action Alternative, in risks to marine mammals, birds, and sea turtles. The increased risks would primarily be associated with changes in disturbance levels on approximately 60 days with hunt-related trips each year. As under the other action alternatives, the potential for whale hunting activities to affect prey availability for killer whales would be minimal, as gray whales are generally abundant in the project area and hunting regulations would prohibit the killing of calves, the primary target of killer whales. Similarly, for the reasons identified in Subsection 4.5.2.3, Potential Injury, the likelihood that any marine mammals or sea turtles might sustain an injury from a vessel or errant projectile would be extremely remote.

Alternative 6 would include the same restrictions on hunt timing and hunt location as Alternative 2. The potential for any given hunt-related trip to result in adverse effects on birds, turtles, or marine mammals other than gray whales would, therefore, be the same as under Alternative 2. For this reason, this analysis considers the effects on marine mammals and on all other marine wildlife species together. Based on the anticipated number of hunt-related trips (60), Alternative 6 would have the same overall potential for adverse effects on wildlife as Alternatives 2 and 3. The potential for each trip to disturb wildlife species would likely be higher than under Alternative 3 because most hunt-related activity would occur within 5 miles (8 km) of shore where the activity would have a greater likelihood of being audible or visible at sensitive locations such as nesting areas or haulouts. Compared to Alternative 4 (under which hunting would be allowed during the summer breeding season for many species), hunt-related activities under Alternative 6 would have a lower potential to disrupt key activities such as breeding because hunting would occur during the months of December through May and would not overlap most of the breeding season for most species.

4.6 Economics

4.6.1 Introduction

This subsection addresses the potential for the alternatives to affect economic conditions in the project area. Whale-hunt-related activities have the potential to affect tourism, the household use of whale products, the whale-watching industry, shipping, sport and commercial fishing, and hunt-related management and law enforcement. As discussed in Subsection 3.6, Economics, the labor force residing on the Makah Reservation in 2010 was about 669 persons, or approximately 2 percent of the total wage and salary workforce in Clallam County. Total personal income for the Makah Reservation is probably an even smaller proportion of countywide total personal income, because per capita income of reservation residents is substantially lower than countywide per capita income (Subsection 3.6.3.2.3, Personal Income). Because the economic contribution of the Makah Reservation to the countywide economy is so small, the potential for any changes on the reservation under the alternatives to have a noticeable effect on economic conditions in Clallam County as a whole is negligible. Moreover, economic effects outside the reservation are expected to be negligible in the context of the countywide economy. For these reasons, potential effects on Clallam County as a whole will not be addressed in this analysis.

One potential economic effect of the action alternatives that is not included in this analysis is the economic burden on individuals or households engaged in hunting if the cost of hunting is borne by individuals rather than by the tribal government. In 2002, the Makah Tribal Council decided not to provide financial support for a hunt, leaving it up to whale-hunting families to support any hunts, consistent with tribal tradition. However, the Council did not indicate whether it would financially support future hunts should they be authorized. If individual families were to finance hunts under the action alternatives, the economic impacts on some Makah households could be substantial, given the high costs of supplies and services necessary to participate in the numerous activities related to whale hunting. Aside from the expenses of actually engaging in the hunt, there would be the costs of acquiring seagoing canoes and other whale-hunting equipment, training time, and hosting ceremonial feasts. These costs must be viewed in the light of both the depressed economic situation of many Makah households (Subsection 3.6.3.2.3, Personal Income) and the Makah Tribe’s restriction that prohibits tribal members who participate in a whale hunt from receiving monetary compensation. It is likely that a family would launch its own whale hunting enterprise only if that family were economically successful during the several months between whale hunting seasons.

These economic constraints would likely affect the number of hunts that could take place in any given year. However, the magnitude of the household costs arising from the whale hunt, and the distribution of these costs across the Makah community, are not reasonably foreseeable because of uncertainty about what costs families would bear rather than the community as a whole, and about the number of families that would organize a whale-hunting crew.

Also, under Alternative 6, the waiver and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Alternative 6 could result in added costs to the U.S. government, the Makah Tribe, and interested parties if a new waiver were pursued, but it is not possible to predict what that impact would be at this time.

4.6.2 Evaluation Criteria

The criteria used to determine the potential for effects on economic conditions under the alternatives include the potential change in revenue, employment, and/or economic value associated with 1) tourist-related business activity; 2) household consumption of whale products, and manufacture and sale of traditional handicrafts; 3) the whale-watching industry; 4) commercial shipping and sport and commercial fishing; and 5) hunt-related management and law enforcement. The following subsections discuss these matters in greater detail and identify how the effects of the alternatives may be assessed and differentiated.

4.6.2.1 Tourism

Tourism is a relatively large industry in Clallam County; visitors spent $178.4 million in the County in 2009 (Table 3-22). Spending in the food and beverage services sector accounted for about 30 percent of total visitor spending and in the accommodations sector accounted for about 21 percent of total visitor spending. Figures are not available for the amount of revenue generated by reservation tourism and recreation or the number of jobs and amount of personal income that depend on visitor spending, but about 8 percent of jobs (including arts, entertainment, recreation, accommodation, food services, and information) held by Makah Reservation residents in 2010 were in sectors that depend directly on tourism (Table 3-27).

Activities associated with a whale hunt, including the hunt itself and harvest-related ceremonies and celebrations, have the potential to affect the tourism industry in Clallam County by changing the number of visitors to the area and their travel expenditures. Persons seeking opportunities to view a whale hunt may visit trails and beaches in the Olympic National Park, OCNMS, and the Makah Reservation. It is possible that visitation to these areas would increase under the action alternatives compared to the No-action Alternative, as interested observers seek vantage points to view the hunt. Also, there is the potential for persons attracted to the area by hunt-related activities (such as protesters, law enforcement officers, media representatives, or other observers) to engage in other activities, such as camping, sightseeing, or wildlife viewing. Spending associated with these activities could increase under the action alternatives (relative to the No-action Alternative).

As described in Subsection 3.6.3.3.1, Summary of Economic Effects of the Makah Gray Whale Hunts, no quantitative information is available concerning the economic effects of the Makah Tribe's practice whale hunt exercises in late 1998, or their whale hunting in the spring of 1999 and of 2000. Protests and media coverage of these events may have temporarily generated an increase in the number of people in the area who might have sought accommodations and services in the communities of Neah Bay, Clallam Bay, and Sekiu. Some anecdotal information suggests this was the case, while other anecdotal information suggests it was not. No economic data demonstrate that the influx of visitors during previous hunt-related events resulted in an increase in the number of rooms rented or in other economic activity. Given the likely influx of visitors coming to Neah Bay to observe, protest, or report on the hunt, or to participate in tribal ceremonies and celebrations, it is reasonable to expect there would be a short-term increase in tourist-related business activity associated with these visitors. Any short-term effect is likely to be minor, and may diminish as more hunts occur. Subsection 3.6.3.3.1, Summary of Economic Effects of the Makah Gray Whale Hunts, indicates that there were fewer protesters at the 2000 hunt than the 1999 hunt. Over the long term, there is no information suggesting that the hunts in 1999 and 2000 had any lasting effect on tourism in Clallam County or Neah Bay. Thus, while a whale hunt might attract visitors to the Neah Bay area, it is likely that any positive effect would be short-term and minor.

In addition to attracting visitors to Clallam County when hunt-related activities occurred, Makah whale hunting might have a broader and longer-term positive effect on the Tribe's efforts to bolster the tribal tourism sector of the reservation economy. As Jollie and Green (2001) report:

> Visitors mostly learned about the Makah Tribe through whaling notoriety and Olympic National Park and hiking trail advertisements. . . . The controversy over whaling has had a direct impact on tourism as people are drawn to the area by media reporting of the whaling events.

Controversy surrounding resumption of whale hunting has rekindled international interest in the Makah people at the same time as tribal tourism and other types of cultural tourism are rapidly gaining popularity throughout the world (Washington State Parks 2004). The Makah Tribe has been an active participant in programs by Washington State and the Affiliated Tribes of Northwest Indians to market tribal tourism (Affiliated Tribes of Northwest Indians undated; Jollie and Green 2001; May 2001).

Although the government sector is the dominant employer on the Makah Reservation (Subsection 3.6.3.2.2, Employment), tourism is also considered a key element of the local economy (Subsection 3.6.3.2.4, Contribution of Tourism to the Local Economy).

Any positive effects of a whale hunt on tourism (both locally and county-wide) could be offset to some extent if opposition to the hunt resulted in boycotts of Olympic Peninsula tourism activities, including boycotts of Neah Bay specifically. Subsection 3.6.3.3.1, Summary of Economic Effects of the Makah Gray Whale Hunts, describes efforts to organize a boycott of the Makah nation, but no available information indicates the boycott had any effect on tribal enterprises. Similarly, there is no evidence that calls for boycotts of Olympic Peninsula tourism had any negative economic impact on tourist-related businesses in the area. It is possible that some persons who might participate in a boycott would not do so if the whale hunting was conducted with restrictions on hunt timing, area, or the number or identity of whales that may be struck. Protest activities and vocal opposition to the hunt have come from groups that have expressed opposition to whale hunting under any conditions, however (Subsection 4.8.3, Evaluation of Alternatives [Social Environment]). Persons opposed to whale hunting under any conditions would be likely to participate in a boycott under any of the action alternatives.

The effects on tourism would depend primarily on 1) the number of days with hunt-related trips, 2) the anticipated number of persons who might be attracted to the area by hunt-related activities (such as reporters, protesters, or observers), and 3) the anticipated amount, intensity, duration, scope, and content of media coverage. The second two factors are also discussed in Subsection 4.12, Aesthetics.

4.6.2.2 Household Use of Whale Products

Under the No-action Alternative (current conditions), Makah tribal members do not have the opportunity to consume freshly harvested whale products. Drift whales or whales incidentally caught in fishing operations may provide an opportunity to consume whale products or to produce hand-crafted articles made from whale products (Subsection 2.4.2, Subsistence Use of Drift Whales). If a whale hunt were authorized under any of the action alternatives, Makah tribal members could consume the meat, blubber, and other edible products obtained from harvested whales (Subsection 2.3.2.2.11, Whale Product Use and Distribution). Moreover, within the borders of the United States, tribal members could share whale products from any hunt with relatives of participants in the harvest, with others in the local community (both non-relatives and relatives), or with persons in locations other than the local community with whom local residents share familial, social, cultural, or economic ties.

Subsistence food products from a whale would not generate revenue through market sales, but would meet nutritional needs of Makah families. Thus, attaching a dollar value to food products from harvested whales is difficult. Nevertheless, the harvest of whales for food has economic value to households as they potentially replace foods that families would otherwise have to purchase. The distribution of subsistence products through sharing networks makes it likely that many households and individuals would enjoy the economic benefits of a whale harvest.

In household surveys conducted in 2001, 2006, and 2011, 80 to 90 percent of survey respondents expressed an interest in increased access to whale products (Subsection 3.10.3.5.1, Makah Whaling). Considering the numbers of whales that could be harvested under the action alternatives and the customary sharing of subsistence resources among tribal members (Subsection 3.10.3.5.2, Makah Subsistence Consumption), the per capita economic value of whale products as a food resource would probably be small. The Tribe's most recent needs statement (Renker 2012) estimates that harvesting an average of four gray whales per year would yield 8 to 20 pounds (4 to 9 kg) of meat per capita and 16 to 20 pounds (7 to 9 kg) of oil or blubber per capita (and a somewhat smaller amount of whale oil after rendering). Nevertheless, the reintroduction of whale food products into the Makah community could help offset potential food shortages if other subsistence resources diminish, and could prevent people from having to spend cash to replace subsistence foods (Renker 1996; 2007; 2012).

In addition, the Makah Tribe could create and sell or offer for sale authentic articles and native handicrafts and clothing, including artwork, made from non-edible whale products, within the United States under any of the action alternatives (Subsection 2.3.2.2.11, Whale Product Use and Distribution). A whale hunt would likely increase the availability of non-edible whale products, compared to the No-action Alternative, for the manufacture and sale of traditional handicrafts. The Makah have a long tradition of manufacturing carvings, baskets, and other items for sale to collectors and tourists (Erikson 2003), and "[t]ribal artisans also produce carvings, jewelry, and silk screen designs for sale in local shops and regional galleries" (Subsection 3.6.3.2.1, General Description of the Local Economy). Seventy-six percent of Makah households expressed a desire for whale bones, possibly to revitalize certain crafts (Subsection 3.10.3.5.1, Makah Whaling). Handcrafted articles made from whale products could become sources of income for some Makah households and a means of perpetuating indigenous art forms and crafts. Renker (1996) notes that the bones of a gray whale incidentally caught in 1995 were distributed to Makah artists through the Makah Cultural and Research Center, which is one of the largest retail outlets of Makah artwork on the reservation (Erikson 2003). According to Renker (2007), some Makahs indicated they were disappointed that the bones of the whale harvested in the 1999 hunt were not made available to the community for private use. They were used by the local school for a bone preservation project instead (Subsection 3.10.3.5.1, Makah Whaling) and currently are on display in the Makah Cultural and Research Center.

The amount of whale products for household consumption and the manufacture and sale of traditional handicrafts would depend on the number of whales that could be harvested.

4.6.2.3 Whale-watching Industry

Whale-watching is not economically important in Clallam County with few whale-watching opportunities available, but there are larger whale-watching operations outside and adjacent to the county in Westport, Washington and Vancouver Island, British Columbia (Subsection 3.6.3.3.2, Commercial Value of Whales). Information on the current numbers of whale-watching expeditions, whale-watching passengers, whale-watching revenues in these areas, or people employed in the whale-watching sector is not available. A Makah gray whale hunt could affect whale-watching revenues or employment if a hunt caused prospective passengers to avoid whale-watching tours; if a hunt occurred in the vicinity of whale-watching operations and disturbed whales, causing them to move away from the area; or if whales altered their behavior as a result of hunting and avoided whale-watching vessels. For the reasons discussed below, it is unlikely that whale-hunting under any of the action alternatives would have more than a negligible effect on whale-watching revenues or employment within or outside the project area through any of these scenarios.

First, while negative publicity about Makah whale hunting could reduce public participation in whale watching in general, there is no information demonstrating such an effect. In addition, it is unlikely that whale-hunting activities under the action alternatives would interfere with whale-watching tours in the project area. There is no evidence that whale-watching operators conduct tours targeting gray whales in the project area. Much of the whale-watching in Clallam County is done from land-based locations along its seashore, although whale-watching charters may be available through some sport fishing boat operators (Subsection 3.6.3.3.2, Commercial Value of Whales). Most whale-watching operations in Washington State focus on killer whales in Puget Sound and the eastern portion of the Strait of Juan de Fuca (an area outside the Makah U&A) (NMFS 2001). While gray whale watching is an important tourist activity off Westport, located on Washington's Pacific coastline at Grays Harbor (Subsection 3.6.3.3.2, Commercial Value of Whales), that area is approximately 80 miles (129 km) south of the Makah U&A. Several of Westport's charter boat businesses offer whale-watching trips from March through May, when gray whales can be viewed just off the coast during their annual migration. It is unlikely that these tour operators would expend the time and fuel to travel to the Makah U&A when gray whales are present immediately off shore. Whale-watching tours from Westport, therefore, would be unlikely to encounter hunt-related activities under any of the action alternatives. The gray whales are northbound at that time and pass Westport before reaching the Makah U&A farther north. Whale-hunting activities under any of the action alternatives, therefore, would be extremely unlikely to scare whales away from areas where they may be encountered by whale-watching tours out of Westport, even during the peak tour period of March through May.

Whale-watching is also an important tourist activity off Vancouver Island (Subsection 3.6.3.3.2, Commercial Value of Whales). Although most Vancouver Island-based whale-watching operators also advertise opportunities for viewing other wildlife, including gray whales, the whale-watching tours and charters focus largely on opportunities for viewing killer whales. Further, none of these operators describes tours that include the Makah U&A.

It is unlikely that gray whales would respond to a Makah tribal hunt by avoiding whale-watching vessels (Subsection 3.4.3.6.6, Vessel Interactions). ENP gray whales have been exposed to hunting for decades by Chukotka Natives, yet that ongoing hunt has not translated into a general avoidance of boats by gray whales (NMFS 2001a; Hoyt and Hvenegaard 2002). There is no evidence to suggest that hunting by the Makah Tribe would cause a change in behavior that has not yet been demonstrated to result from a far more extensive hunt. ENP gray whale behavior also does not appear to have been affected by other types of human and vessel activity. As described in Subsection 3.4.3.6.6, Vessel Interactions, these whales migrate through waters occupied by large numbers of commercial and private vessels. Off the coast of Los Angeles, California, during the whale-watching season, Rugh et al. (1999) reported that 8 to 12 boats may follow a single whale. The number of approaches incidental to Makah whale hunting would be minor compared to the whales' existing level of exposure to vessels. Similarly, as described in Subsection 4.5, Other Wildlife, any effects of a hunt on other marine mammals that might be a target of whale-watching operators would likely be localized and temporary.

Finally, over time an ongoing hunt could reduce the abundance of whales in the PCFG range by a current maximum of one to five whales per year (or a more likely range of 0.2 to 2.8 whales per year depending on the alternative), which could in turn reduce the number of gray whale encounters/sightings experienced during whale-watching tours if more whales do not recruit to replace the harvested whales. However, whale-watching operators are adept at finding whales (especially killer whales) and many advertise their high success rate and guarantee sightings (e.g., Island Adventures 2014; Vancouver Whale Watch 2014), although not necessarily of gray whales. Also, active whale sighting networks typically include reports from whale-watching charters that can make it easier for operators to locate even lone animals or small concentrations of animals, including gray whales (Orca Network 2014; Pacific Whale Watch Association 2014). Moreover, because gray whales are not typically targeted by most whale-watching operators it is unlikely that a decrease in the numbers of gray whales would appreciably impact the public's incentive to pursue whale watching in the PCFG range.

If a Makah gray whale hunt were to alter gray whale behavior or result in a reduction in gray whale numbers, it is not possible to estimate the amount of decrease that might occur in revenues of whale-watching operators. Current revenues of whale-watching operators are unknown, and there is no information available or that could reasonably be obtained that would allow an estimation of how much whale-watching revenues might decrease if gray whale behavior or numbers were altered by a Makah hunt. The extent to which a Makah hunt had an effect on gray whale behavior or numbers, and a subsequent indirect effect on whale-watching revenues, would depend primarily on factors that could reduce the abundance of whales or cause whales to avoid boats, including the number of whales that could be struck and the estimated number of whales killed or subjected to harpoon attempts and approaches.

4.6.2.4 Shipping and Ocean Sport/Commercial Fishing

Under the No-action Alternative, the value of commercial shipping in Washington State is $77 billion, a substantial proportion of which is the result of shipping that passes through the project area (Subsection 3.6.3.1.4, Commercial Shipping). Between 2003 and 2011, expenditures associated with recreational salmon fishing generated between $226,000 and $1.4 million of personal income (in 2011 dollars) in Neah Bay each year, with the recreational groundfish fishery likely accounting for comparable spending levels (Subsection 3.6.3.2.5, Contribution of Ocean Sport Fishing to the Local Economy). Most fishing derbies in Clallam County take place during late spring through early autumn. The value of commercial fish landings at the Port of Neah Bay between 2007 and 2011 ranged from $5.9 to $9.0 million annually (Subsection 3.6.3.2.6, Contribution of Ocean Commercial Fishing to the Local Economy).

If whale hunting restricted the operations of commercial shipping traffic or sport and commercial fishing vessels, it could affect revenues or employment associated with these sectors. Vessels not involved in whale hunting would have to maintain prudent distances from whale hunts as a safety precaution. As discussed in Subsection 2.3.2.2.12, Other Environmental Protection Measures; Public Safety Measures and Enforcement, there would be a moving exclusionary zone (MEZ) with a 500-yard (457-m) radius centered on tribal vessels actively engaged in a whale hunt under any of the action alternatives. No person or vessel would be able to enter the MEZ when it was activated, except for the authorized Makah whale hunt vessel, a media pool vessel preauthorized by the Coast Guard, or another vessel or person preauthorized by the Coast Guard. The requirement to remain outside the MEZ could increase operating costs if it caused vessels to take longer routes to reach their destinations or could decrease revenues if it prevented fishing vessels from accessing fishing grounds. It is possible that revenues associated with shipping, sport fishing, or commercial fishing could decrease in response to these restrictions.

The small size and limited duration of the MEZ would likely result in negligible disruption of commercial shipping or sport and commercial fishing. Further, as described in Subsection 4.13.2.2, Marine Traffic, hunt-related activities would probably not interfere with commercial shipping traffic because most, if not all, hunting would likely occur within the Coast Guard RNA, which lies almost entirely within the OCNMS area to be avoided.

The potential for any of the alternatives to affect shipping or sport and commercial fishing would depend primarily on the number of times the MEZ would be activated. It is not possible to predict how many times the MEZ would be activated on a given day of hunting, but it is reasonable to expect that MEZ activation would be no more or less likely to occur on one day of hunting compared to another. For this reason, the number of days of hunting is used to indicate the number of times the MEZ would be activated under any of the alternatives. (Note that this analysis differs from many of the other resource area analyses in this EIS because it focuses on days of actual hunting rather than days with hunt-related trips [i.e., hunting or scouting]). For sport fishing operations, the potential for an effect could also depend on the season that hunting is allowed. Sport fishing for salmon occurs during the summer and early fall, while sport fishing for other species occurs year-round (Subsection 3.6.3.2.5, Contribution of Ocean Sport Fishing to the Local Economy). Hunting that occurs on summer days would have a greater potential to affect sport fishing than hunting that occurs on winter days.

4.6.2.5 Management and Law Enforcement

Under the No-action Alternative, NMFS' annual budget for marine mammal management in the West Coast Region during 2012 and 2013 has ranged from $766,000 to $903,000 per year (NMFS 2014a). The overall budget for monitoring the ENP gray whale population is approximately $75,000. Within the ENP gray whale budget, funding has been provided for photo-identification studies of gray whales in local survey areas with one purpose, among others, being management of a potential Makah gray whale hunt. It is uncertain whether NMFS would continue to fund the photo-identification program if a hunt was not authorized. Because no gray whale hunting currently occurs, there are no NMFS observers associated with a hunt.

If a whale hunt were authorized under any of the action alternatives, it is likely that hunting would be monitored and evaluated for its impact on the ENP gray whale population in general and on PCFG whales in particular. Funding would likely continue for the photo-identification studies aimed at identifying PCFG whales. Estimated annual costs for NMFS for the photo-identification study are $75,000 (NMFS 2014a). Funding would also likely be provided for NMFS and Makah observers during and immediately following a hunt (Subsection 2.3.2.2.12, Other Environmental Protection Measures). The cost of a NMFS observer could be as high as $8,000 per month (i.e., averaging $263 per day) (NMFS 2014a).

If whale hunting by the Tribe engendered protests by whaling opponents, as it has in the past, there would likely be law enforcement operations to maintain order. Past law enforcement activities have involved the United States Coast Guard, NMFS Office of Law Enforcement, the State of Washington, Clallam County Sheriff's Office, and Makah tribal police. Estimated costs for all non-tribal agencies could approach $91,670 per day, with the bulk of costs associated with United States Coast Guard aircraft and vessels (NMFS 2014a) (Table 4-14).

Under any of the action alternatives, costs associated with hunt observers or with law enforcement would depend primarily on the number of days of hunt-related trips (Table 4-1). The costs for hunt observers would increase (relative to the No-action Alternative) by at least the number of days of hunting per year. Given the remoteness of the project area, it is likely that observers would need to be paid for additional days because of travel times to and from Neah Bay.[13] Therefore, we assume that the number of days with hunt-related trips is a better cost estimator. It is not possible to predict the number of days of preparation or protests that would occur for each day of hunting. Estimated enforcement costs for any of the alternatives may therefore be conservative. Costs for photo-identification studies would likely be the same regardless of the action alternative implemented.

4.6.3 Evaluation of Alternatives

The following subsections consider the potential for the alternatives to affect economic conditions both within and outside the project area. Potential effects outside the project area include such things as changes in revenue or employment associated with whale watching and tourism. For each alternative, the discussion addresses the potential effects on tourism, household use of edible and non-edible whale products, the whale-watching industry, commercial shipping, sport and commercial fishing, and management and law enforcement.

Under any of the action alternatives, tourist-related enterprises in and around the project area could experience a minor increase in business activities over the short term compared to the No-action Alternative. Interested tourists and other visitors would most likely visit the project area to observe the whale hunt and might participate in harvest-related celebrations as media stories raised public awareness of the Makah whale hunt and the Tribe's whale hunting tradition. Some individuals might

[13] During the 1999 hunt, the NMFS observer needed a day to travel to Neah Bay after being contacted by the whaling captain, as well as the following day to coordinate with the whaling crew (Gosho 1999).

decide not to visit the project area based on negative publicity about the whale hunt. Overall, it is reasonable to expect more visitors would be drawn to the area than avoid the area as a result of a whale hunt, potentially resulting in a minor short-term increase in tourism-related business activity. The amount of any such potential short-term increase would likely depend on the number of days with hunt-related trips under a particular alternative. Thus, alternatives with more days with hunt-related trips would likely result in a greater increase.

The potential also exists for increased long-term business activity (relative to the No-action Alternative) as a result of expansion of the tribal tourism sector of the reservation economy. Such a potential is likely linked to whether hunting occurs at all and is therefore likely to be similar across all of the action alternatives.

Under any of the action alternatives, the potential for whale products to become available for household consumption and the making and selling of handicraft articles would increase (relative to the No-action Alternative) as a result of the opportunity for tribal members to harvest whales. The amount of any increase would depend on the number of whales likely to be harvested under a particular alternative. Thus, alternatives with higher harvest levels would likely result in a greater increase.

The lowest risk of adverse effects on whale-watching operators, commercial shipping traffic, and sport and commercial fisheries would occur under the No-action Alternative because no whale hunts would be permitted under this alternative. Under any of the action alternatives, it is unlikely that Makah whale hunting would have more than a negligible effect on whale watching, for the reasons described above (Subsection 4.6.2.3, Whale-watching Industry). To the extent such an impact did occur, the amount of risk would probably depend on the number of whales that could be killed, struck, or exposed to harpoon attempts and approaches. Thus, alternatives that result in greater numbers of harvested whales, strikes, harpoon attempts, or approaches would have a greater potential to adversely affect whale-watching operators.

The potential for disruption of commercial shipping traffic and sport and commercial fisheries would probably be negligible because of the small size and duration of the MEZ. To the extent such an impact did occur, the amount of disruption would probably depend on the number of times the MEZ was activated, which would depend on the number of days of hunting. Thus, alternatives that result in more days of hunting would have a greater potential to adversely affect commercial shipping traffic and sport and commercial fisheries.

The potential for economic effects associated with the costs of law enforcement and management would be lowest under the No-action Alternative, while alternatives that involve more days with hunt-related trips and longer hunting seasons could potentially have higher associated costs.

4.6.3.1 Alternative 1, No Action

Under the No-action Alternative, no whale hunt would be permitted and no whale hunting or associated activities (e.g., ceremonies, celebrations, protests, monitoring, and law enforcement) would be anticipated. There would be no potential for visitors to view hunt-related activities in the project area or to participate in harvest-related celebrations. There would also be no potential for media coverage of the whale hunt that might, in turn, generate interest in the Makah Reservation as a cultural tourism destination. Consequently, the level of business activity for tourist-related enterprises in and around the project area would not be expected to differ from the current level.

With the possible exception of products from drift whales, there would be no potential for households to consume whale meat and blubber or use non-edible whale products for the manufacture and sale of traditional handicrafts. There would be no potential for a whale hunt to disrupt the whale-watching industry, commercial shipping, or sport or commercial fishing. Consequently, the economic conditions of the whale-watching industry, commercial shipping, and sport and commercial fishing would probably not differ from current conditions. The lack of whale hunting would make monitoring and enforcement unnecessary, so there would be no additional costs associated with these activities. The current costs for photo-identification studies may or may not continue.

4.6.3.2 Alternative 2, Tribe's Proposed Action

Under Alternative 2, hunt-related trips would likely occur on approximately 60 days from December through May, but primarily during April and May (Subsection 4.1.2.1, Potential Timing of a Hunt and Number of Hunting Days [Alternative 2]). The limit on the number of whales struck would be seven and the limit on the number of harvested whales would be an average of four per year with a maximum of five in any one year. Approximately 42 whales would be exposed to harpoon attempts and 353 would be approached annually (Table 4-1). Compared to the No-action Alternative, under which there would be no hunting, Alternative 2 would likely result in 1) minor short-term increases in tourism on or near the approximately 60 days per year when hunt-related trips would be expected to occur, 2) an increase of four whales annually available for household use by Makah tribal members, 3) negligible changes in whale-watching revenues, 4) minor increases in the potential for interference with shipping and sport/commercial fishing vessels, and 5) an increase in expenditures for management and law enforcement.

4.6.3.2.1 Tourism

Under Alternative 2, visitors would likely be drawn to the project area on or near the approximately 60 days per year on which hunt-related trips would be expected to occur, potentially creating a minor increase in the level of business activity for nearby tourist-related businesses, compared to the No-action Alternative (under which no visitors would come to the project area to observe whale hunts). The number of whale hunts portrayed in the media would also likely increase compared to the No-action Alternative, possibly increasing public interest in the Makah Reservation as a cultural tourism destination (or, conversely, causing some individuals to avoid the project area because of negative publicity). The increased business activity would likely be short-term (lasting only during the days immediately surrounding hunt-related activities), as visitors would come to observe the hunt and to participate in harvest-related celebrations. Hunting would be allowed from December 1 through May 31, but would most likely occur during April and May. Potential inclement weather during April and May could deter visitors from coming to observe a whale hunt or participate in harvest-related ceremonies.

It is uncertain whether a hunt would result in a long-term increase in tourism. Publicity about the whale hunt could generate interest in the Makah Reservation as a cultural tourism destination, while some individuals might not visit the project area because of negative publicity about the whale hunt. Subsection 3.6.3.3.1, Summary of Economic Effects of the Makah Gray Whale Hunts, describes efforts to organize a boycott of the Makah nation, but no available information indicates the boycott had any effect on tribal enterprises. Similarly, there is no evidence that calls for boycotts of Olympic Peninsula tourism had any negative economic impact on tourist-related businesses in the area.

4.6.3.2.2 Household Use of Whale Products

Compared to the No-action Alternative (under which no whales could be harvested and the Tribe would have access only to drift whales or whales incidentally caught in fishing gear), up to five whales annually could be harvested under Alternative 2, with an average annual harvest of four whales allowed. The limit on the number of PCFG whales killed per year would be four, based on current population estimates (Table 4-3). In addition, only PCFG whales harvested, not whales struck and lost, would be counted toward that limit. It is, therefore, unlikely that limits on PCFG whale mortality would restrict the total number of whales harvested per year under Alternative 2. The hunting season would be restricted to the period from December 1 through May 31, with most hunts likely occurring during April and May. Potential inclement weather during these months would likely affect the number of days the Tribe could hunt, which could affect the Tribe's ability to harvest the full number of whales allowed.

Under Alternative 2, the amount of whale products available for household consumption, and manufacturing and selling of traditional handicrafts would increase relative to the No-action Alternative. The increased availability of whale products would have the potential to replace foods that Makah families would otherwise have to purchase and result in increased income for households that participate in the making and selling of traditional handicrafts. The increase would come from whales the Tribe was actually able to harvest, which would likely be up to four whales annually. The actual number of whales harvested each year could be lower because of the constraints on PCFG whales and the hunting season.

4.6.3.2.3 Whale-watching Industry

Compared to the No-action Alternative (under which no whales would be struck, exposed to harpoon attempts, or approached by hunters), under Alternative 2, up to 7 whales may be struck or killed annually, 42 exposed to unsuccessful harpoon attempts, and 353 approached. As noted above, limits on the harvest of PCFG whales would not be likely to restrict the Tribe's ability to harvest the full number of whales allowed, nor the number of whales struck, exposed to unsuccessful harpoon attempts, and approached. The hunting season would be restricted to the period from December 1 through May 31, with most hunts likely occurring during April and May. Potential inclement weather during these months would likely affect the number of days the Tribe could hunt, which could also affect the number of whales harvested, struck, exposed to unsuccessful harpoon attempts, and approached.

As described in Subsection 4.6.2.3, Whale-watching Industry, there is no information to suggest that individuals would avoid whale-watching tours if a Makah hunt is authorized, and it is unlikely that Makah hunting activities would overlap geographically with whale-watching tours. It is also unlikely that a reduction in the number of gray whales (which are not typically targeted by whale-watching operators) would change public interest in whale-watching tours, nor is it likely that gray whales would respond to a Makah tribal hunt by avoiding whale-watching vessels. As described in Subsection 4.5, Other Wildlife, it is likely that any effects of a hunt on other marine mammals, which might be a target of whale-watching operators, would be localized and temporary. To the extent such an effect might occur under Alternative 2, it is not possible to estimate the amount of decrease that might occur in revenues associated with whale watching. Current revenues of whale-watching operators are unknown, and there is no information available or that could be obtained that would allow an estimation of how much revenues might decrease if ENP gray whale behavior were altered by a Makah hunt.

4.6.3.2.4 Shipping and Ocean Sport/Commercial Fishing

Compared to the No-action Alternative (under which there would be no whale hunts and no activation of the MEZ), activation of the MEZ during hunting on approximately 33 days (Table 4-1) under

Alternative 2 would lead to an increased potential for restricting operations of commercial shipping vessels and sport and commercial fishing. Hunting would likely occur primarily in April and May when there are more suitable hunting days.

The small size of the MEZ and limited duration of activation would likely result in negligible potential for disruption of commercial shipping or sport and commercial fishing. Further, as described in Subsection 4.13.2.2, Marine Traffic, hunt-related activities would probably not interfere with commercial shipping traffic because most, if not all, hunting would likely occur within the Coast Guard RNA, which lies almost entirely within the OCNMS area to be avoided. Also, most sport fishing for salmon occurs outside the time that whale hunting would take place under Alternative 2. Consequently, only minor economic impacts to commercial shipping or sport and commercial fisheries would be expected as a result of implementing Alternative 2.

4.6.3.2.5 Management and Law Enforcement

Compared to the No-action Alternative (under which no whale-hunting or associated protests would occur), Alternative 2 could result in up to 60 days of hunt-related trips and associated commitments of observers and enforcement personnel, vehicles, and equipment. The costs for hunt observers would increase (relative to the No-action Alternative) by at least the number of days of hunting per year (33 days) (Table 4-1). Given the remoteness of the project area, it is likely that observers would need to be paid for additional days because of travel times to and from Neah Bay. Therefore, we assume that the number of days with hunt-related trips (60 days) is a better estimator; costs for a NMFS observer for 60 days could be as high as $15,780 (NMFS 2014a) (Table 4-14) under Alternative 2. It is uncertain whether the existing photo-identification study would continue to be funded under the No-action Alternative. If not, then its continuation under Alternative 2 could represent an increased cost beyond the No-action Alternative.

If whale hunting by the Tribe engenders protests by whaling opponents, as it has in the past, there could also be costs associated with law enforcement activities. These costs would be an increase over the No-action Alternative by the number of days when hunt-related activities (e.g., hunting, protests, and ceremonies) occurred that required a law enforcement presence. Although likely days of hunting (33 days) would represent the minimum number of days on which a law enforcement presence might be required, the number of days with hunt-related trips (60 days) may represent a more reasonable, upper estimate given the past history of interest and protest activity associated with this whale hunt. Estimated costs for all non-tribal agencies could be as high as $5.5 million over the course of 60 days, with the bulk of costs associated with United States Coast Guard aircraft and vessels (NMFS 2014a) (Table 4-14).

4.6.3.3 Alternative 3, Offshore Hunt

Under Alternative 3, as under Alternative 2, hunt-related trips would be likely to occur on approximately 60 days from December 1 through May 31, but primarily during April and May. Based on the expectation that scouting expeditions would also be prepared to hunt if whales were found, it is assumed for this analysis that hunting could also occur on approximately 60 days each year (Subsection 4.1.3.1, Potential Timing of a Hunt and Number of Hunting Days[Alternative 3]). Although Alternative 3 would include the same limit on the number of whales harvested as Alternative 2, the limit on the number of whales struck would be six instead of seven. It is assumed for this analysis that approximately 36 whales would be exposed to harpoon attempts and 353 would be approached annually (Table 4-1). Compared to the No-action Alternative, under which there would be no hunting, Alternative 3 would likely result in 1) minor short-term increases in tourism on or near the approximately 60 days per year when hunt-related trips would be expected to occur, 2) an increase of four whales annually available for household use by Makah tribal members, 3) negligible changes in whale-watching revenues because of changes in whale behavior as a result of interactions between hunters and whales, 4) minor increases in the potential for interference with commercial shipping and sport and commercial fishing vessels, and 5) an increase in expenditures for management and law enforcement during the likely 60 days with hunt-related trips.

Because both Alternative 2 and Alternative 3 would be expected to result in the same number of days with hunt-related trips, the potential effects on tourist-related business activity under Alternative 3 would likely be the same as those under Alternative 2.

4.6.3.3.1 Tourism

Under Alternative 3, visitors would likely be drawn to the project area on or near the approximately 60 days per year on which hunt-related trips would be expected to occur, potentially creating a minor increase in the level of business activity for nearby tourist-related businesses, compared to the No-action Alternative (under which no visitors would come to the project area to observe whale hunts). The number of whale hunts portrayed in the media would also likely increase compared to the No-action Alternative, possibly increasing public interest in the Makah Reservation as a cultural tourism destination (or, conversely, causing some individuals to avoid the project area because of negative publicity). The increased business activity would likely be short-term (lasting only during the days immediately surrounding hunt-related activities), as visitors would come to observe the hunt and to participate in harvest-related celebrations. Hunting would be allowed from December 1 through May 31, but would most likely occur during April and May. Potential inclement weather during April and

May could deter visitors from coming to observe a whale hunt or participate in harvest-related ceremonies.

It is uncertain whether a hunt would result in a long-term increase in tourism. Publicity about the whale hunt could generate interest in the Makah Reservation as a cultural tourism destination, while some individuals might not visit the project area because of negative publicity about the whale hunt.

4.6.3.3.2 Household Use of Whale Products

Compared to the No-action Alternative (under which no whales could be harvested and the Tribe would have access only to drift whales or whales incidentally caught in fishing gear), up to five whales annually could be harvested under Alternative 3, with an average annual harvest of four whales allowed. In contrast to Alternative 2, however, whales struck and lost would be counted toward the annual mortality limit for PCFG whales, potentially reducing the total number of whales that could be harvested in some years. Under some scenarios, it is possible that hunting activities for a given year could be curtailed before any whales are successfully harvested (Subsection 4.1.3, Alternative 3). Compared to Alternative 2, therefore, it is less likely that the Tribe would be able to harvest an average of four whales per year under Alternative 3. Alternative 3 could thus have a smaller increase (relative to the No-action Alternative) in the amount of whale products available for household consumption, and manufacturing and selling of traditional handicrafts than would Alternative 2. The potential for replacement of foods that Makah families would otherwise have to purchase and increased income for households that participate in the making and selling of traditional handicrafts would likewise be smaller than under Alternative 2, although greater than under the No-action Alternative.

4.6.3.3.3 Whale-watching Industry

Compared to the No-action Alternative (under which no whales would be struck, exposed to harpoon attempts, or approached by hunters), under Alternative 3, up to 6 whales may be struck or killed annually, 36 exposed to unsuccessful harpoon attempts, and 353 approached. Although these estimates are similar to those for Alternative 2 (under which up to 7 whales may be struck annually, 42 exposed to unsuccessful harpoon attempts, and 353 approached), the actual numbers of whales killed, struck, exposed to harpoon attempts, or approached by hunters each year under Alternative 3 could be substantially smaller. As explained above in the analysis of household use of whale products, the mortality limit for PCFG whales under Alternative 3 could, in some years, result in the curtailment of the hunt before the harvest limit is attained. Therefore, the potential for a change in revenues or employment associated with whale watching, compared to the No-action Alternative, could be somewhat lower than the potential described for Alternative 2.

As described in Subsection 4.6.2.3, Whale-watching Industry, there is no information to suggest that individuals would avoid whale-watching tours if a Makah hunt is authorized, and it is unlikely that Makah hunting activities would overlap geographically with whale-watching tours. It is also unlikely that a reduction in the number of gray whales (which are not typically targeted by whale-watching operators) would change public interest in whale-watching tours, nor is it likely that gray whales would respond to a Makah tribal hunt by avoiding whale-watching vessels. As described in Subsection 4.5, Other Wildlife, it is likely that any effects of a hunt on other marine mammals, which might be a target of whale-watching operators, would be localized and temporary. To the extent such an effect might occur under Alternative 3, it is not possible to estimate the amount of decrease that might occur in revenues or employment associated with whale watching. Current revenues of whale-watching operators are unknown, and there is no information available or that could be obtained that would allow an estimation of how much revenues might decrease if ENP gray whale behavior were altered by a Makah hunt.

4.6.3.3.4 Shipping and Ocean Sport/Commercial Fishing

Compared to the No-action Alternative (under which there would be no whale hunts and no activation of the MEZ), activation of the MEZ during hunting on approximately 43 days under Alternative 3 would lead to an increased potential for restrictions on the movement of commercial shipping traffic and sport and commercial fishing. Hunting would occur primarily in April and May.

Compared to Alternative 2, the additional days of hunting (43 days under Alternative 3 versus 33 days under Alternative 2 of estimated suitable hunting conditions) would result in more instances of the MEZ being activated. This would increase the potential for whale hunting to interfere with commercial shipping or sport and commercial fishing operations beyond the potential under Alternative 2. However, as under Alternative 2, the small size of the MEZ and limited duration of activation would likely result in a negligible potential for disruption of vessel movement or fishing operations. The potential for hunt-related activities to interfere with commercial shipping traffic would be further minimized because most, if not all, hunting would likely occur within the Coast Guard RNA, which lies almost entirely within the OCNMS area to be avoided. Also, whale hunting under Alternative 3 would take place outside of the period when most sport fishing for salmon occurs in the project area. Consequently, only minor economic impacts to commercial shipping or sport and commercial fisheries would be expected as a result of implementing Alternative 3.

4.6.3.3.5 Management and Law Enforcement

Under Alternative 3, hunt-related trips would be likely to occur on approximately 60 days from December 1 through May 31, but primarily during April and May. Based on the expectation that scouting expeditions would also be prepared to hunt if whales were found, it is assumed for this analysis that management and law enforcement resources could also be needed on approximately 60 days with hunt-related trips each year. Therefore, under Alternative 3, costs would be incurred for NMFS and Makah observers during 60 days, resulting in an increase in costs (relative to the No-action Alternative) and the same costs estimated under Alternative 2. Costs associated with photo-identification studies under Alternative 3 would be the same as under Alternative 2. It is uncertain whether the existing photo-identification study would continue to be funded under the No-action Alternative. If not, then its continuation under Alternative 3 could represent an increased cost beyond the No-action Alternative. Daily costs for enforcement could be less under Alternative 3 than the other action alternatives because hunting would take place farther off shore (Makah hunters would be prohibited from making an initial strike on a gray whale within 5 miles (8 km) of shore). Restricting hunts to offshore areas might result in a decreased need for law enforcement response, compared to the other action alternatives, because of the range limitations of some vessels (e.g., jet skis) used by protesters. If fewer people are able to participate in protests near vessels engaged in hunting, there may be fewer situations that result in the issuance of citations for negligent vessel operations, MMPA take violations, or violations of the MEZ. However, many law enforcement elements would still be deployed to monitor the hunt and the vessels transiting to and from the hunt area, and to prepare for any land-based protests. Therefore, law enforcement costs under Alternative 3 would be higher than under the No-action Alternative and would likely be the same or less than those estimated under Alternative 2.

4.6.3.4 Alternative 4, Summer/Fall Hunt

Under Alternative 4, the hunting season would extend from June 1 through November 30 instead of December through May. The maximum number of whales struck or harvested under current conditions would be limited to one ENP male whale per year. Based on the expectation that locating and striking a known ENP male would take no more than 7 days (Subsection 4.1.4, Alternative 4), hunt-related trips under Alternative 4 would be likely to occur on approximately 7 days per year. It is assumed for this analysis that approximately 6 whales would be exposed to harpoon attempts and 58 would be approached annually (Table 4-8). Based on the above, Alternative 4 would have a lower potential than Alternative 2 to result in changes in revenue, employment, and/or economic value, relative to the No-action Alternative, associated with 1) tourist-related business activity, 2) household consumption and manufacture and sale of traditional handicrafts, 3) the whale-watching industry, 4) commercial shipping, sport/commercial fishing, and 5) hunt-related management and law enforcement.

4.6.3.4.1 Tourism

Under Alternative 4, visitors would likely be drawn to the project area on or near the approximately 7 days on which hunt-related trips would be expected to occur, potentially creating a minor increase in the level of business activity for nearby tourist-related businesses, compared to the No-action Alternative (under which no visitors would come to the project area to observe whale hunts). The number of whale hunts portrayed in the media would also likely increase compared to the No-action Alternative, possibly increasing public interest in the Makah Reservation as a cultural tourism destination (or, conversely, causing some individuals to avoid the project area because of negative publicity). The increased business activity would likely be short-term (lasting only during the period immediately surrounding hunt-related activities), as visitors would come to observe the hunt and to participate in harvest-related celebrations.

Compared to Alternative 2, the reduced number of days with hunt-related trips (7 versus 60) would probably result in a smaller increase (relative to the No-action Alternative) in the total number of visitors coming to the Makah Reservation to observe a whale hunt and/or participate in activities associated with the hunt, such as harvest-related celebrations. Conversely, visitation on days with hunt-related activities may be higher than under Alternative 2 because hunts would likely occur during the summer when visitation by tourists to the Olympic Peninsula is comparatively higher than during April and May (when most hunting would likely occur under Alternative 2). Increased visitation would be expected to increase business activity for tourist-related enterprises in and around the project area. The overall increase would, however, likely be smaller than under Alternative 2 because increased visitation would occur on fewer days.

4.6.3.4.2 Household Use of Whale Products

Under Alternative 4, the amount of whale products available for household consumption, and manufacturing and selling of traditional handicrafts would increase relative to the No-action Alternative (under which no whales could be harvested and the Tribe would have access only to drift whales or whales incidentally caught in fishing gear). The increased availability of whale products would have the potential to replace foods that Makah families would otherwise have to purchase and result in increased income for households that participate in the making and selling of traditional handicrafts. The increase would come from whales the Tribe was actually able to harvest, which would be no more than one whale annually. It is possible, however, that no whales could be harvested in some years if tribal hunters are unable to locate and strike a known ENP male or if a whale is struck and lost (in which case the hunt would be ended for the year).

Compared to Alternative 2, therefore, Alternative 4 would have a smaller increase (relative to the No-action Alternative) in the amount of whale products available for household consumption, and manufacturing and selling of traditional handicrafts. The potential for replacement of foods that Makah families would otherwise have to purchase and increased income for households that participate in the making and selling of traditional handicrafts would likewise be smaller than Alternative 2, although greater than under the No-action Alternative.

4.6.3.4.3 Whale-watching Industry

Compared to the No-action Alternative (under which no hunts would occur and no whales would be struck, exposed to harpoon attempts, or approached by hunters), Alternative 4 would result in an increased potential for effects on whale-watching revenues or employment. The increase would, however, be smaller than under any of the other action alternatives because Alternative 4 would be expected to result in the fewest whales killed (1), struck (1), exposed to harpoon attempts (6), or approached (58) per year. For the reasons provided in Subsection 4.6.2.3, Whale-watching Industry, it is unlikely that whale hunting under Alternative 4 would have more than a negligible effect on whale-watching revenues or employment within or outside the project area through any of the scenarios described. In addition, to the extent that any such effects might occur, it is not possible to estimate the amount of decrease that might occur in revenues or employment associated with whale watching.

4.6.3.4.4 Shipping and Ocean Sport/Commercial Fishing

Compared to the No-action Alternative (under which there would be no whale hunts and no activation of the MEZ), activation of the MEZ on approximately 7 days during a whale hunt under Alternative 4 would lead to an increased potential for restricting operations of commercial shipping vessels and sport and commercial fishing. Hunting would occur primarily during the summer months.

Compared to Alternative 2, the reduced number days with whale hunts (7 versus 33) would result in fewer instances of the MEZ being activated. Alternative 4 would, therefore, result in a smaller increase (relative to the No-action Alternative) in the potential for whale hunting to interfere with commercial shipping or commercial fishing operations than would Alternative 2. As noted above, the number of days when whale hunts result in MEZ activation could be substantially fewer in years when a whale is struck and lost and the hunt is curtailed.

Because hunting would be allowed during the summer, Alternative 4 would result in a greater potential, compared to any of the other action alternatives, for a given instance of MEZ activation to interfere with sport salmon fishing (which occurs during summer and early fall). Alternative 4 could, therefore, have a slightly greater potential than the other action alternatives to affect sport salmon fishing. As under Alternative 2, however, only minor economic impacts to commercial shipping or sport and commercial fisheries would be expected as a result of implementing Alternative 4.

4.6.3.4.5 Management and Law Enforcement

Under Alternative 4, hunting would be likely to occur on approximately 7 days during the summer, during which costs would be incurred for management and law enforcement agencies. Observer costs would be an increase relative to the No-action Alternative but less than the 33 days likely under Alternative 2 or the 60 days under Alternative 3. Estimated costs for a NMFS observer for 7 days could be as high as $1,841 (NMFS 2014a) (Table 4-14). Costs associated with photo-identification studies under Alternative 4 would be the same as under Alternatives 2 and 3. It is uncertain whether the existing photo-identification study would continue to be funded under the No-action Alternative. If not, then its continuation under Alternative 4 would represent an increased cost beyond current conditions.

Compared to the No-action Alternative, law enforcement costs would increase by the number of days (7) when hunt-related activities (e.g., hunting, protests, and ceremonies) occurred that required a law enforcement presence. Estimated costs for all non-tribal agencies could be as high as $641,690 over the course of 7 days, with the bulk of costs associated with United States Coast Guard aircraft and vessels (NMFS 2014a) (Table 4-14). Therefore, law enforcement costs under Alternative 4 would be higher than under the No-action Alternative but would likely be lower than those estimated under Alternatives 2 and 3, which have more days of hunt-related trips.

4.6.3.5 Alternative 5, Split-season Hunt

Under Alternative 5, the hunting season would be 3 weeks in December and 3 weeks in May, in contrast to the 6-month-long hunting seasons under the other action alternatives. In addition, the landing of a single PCFG whale, or the striking and losing of a single whale, would end the hunt for any given year. A maximum of five whales could be struck or killed per year. Approximately 30 whales would be exposed to harpoon attempts and 122 would be approached annually. Hunt-related trips would likely occur on approximately 22 days in December and May, but primarily during May. If tribal members hunted on every suitable hunting day during the December and May seasons, there would be approximately 15 days with actual hunting each year (Subsection 4.1.5.1, Potential Timing of a Hunt and Number of Hunting Days [Alternative 5]).

Compared to the No-action Alternative, under which there would be no hunting, Alternative 5 would be likely to result in 1) minor short-term increases in tourism on or near the approximately 22 days per year when hunt-related trips would be expected to occur, 2) an increase of up to one whale annually available for household use by Makah tribal members, 3) negligible changes in whale-watching revenues because of reduced numbers of gray whales or changes in whale behavior as a result of interactions between hunters with whales, 4) minor increases in the potential for interference with shipping and sport/commercial fishing vessels, and 5) an increase in expenditures for management and law enforcement.

4.6.3.5.1 Tourism

Under Alternative 5, visitors would likely be drawn to the project area on or near the approximately 22 days on which hunt-related trips would be expected to occur, potentially creating a minor increase in the level of business activity for nearby tourist-related businesses, compared to the No-action Alternative (under which no visitors would come to the project area to observe whale hunts). The number of whale hunts portrayed in the media would also likely increase compared to the No-action Alternative, possibly increasing public interest in the Makah Reservation as a cultural tourism destination (or, conversely, causing some individuals to avoid the project area because of negative publicity). The increased business activity would likely be short-term (lasting only during the days immediately surrounding hunt-related activities), as visitors would come to observe the hunt and to participate in harvest-related celebrations.

Compared to Alternative 2, the reduced number of days with hunt-related trips (22 versus 60) would probably result in a smaller increase (relative to the No-action Alternative) in the total number of visitors coming to the Makah Reservation to observe a whale hunt and/or participate in activities associated with the hunt, such as harvest-related celebrations. The number of days with hunt-related trips could decrease to as few as 0 days in years in which the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale.

4.6.3.5.2 Household Use of Whale Products

Based on the constraints imposed by the hunting season and the PCFG mortality limit, it is expected that the Tribe would harvest up to one whale per year (Subsection 4.1.5, Alternative 5). During years in which no whales are struck and lost, and no PCFG whales are killed, the maximum limit for the number of whales harvested would be as under Alternatives 2 and 3. Compared to the No-action Alternative (under which no whales could be harvested and the Tribe would have access only to drift whales or whales incidentally caught in fishing gear), therefore, Alternative 5 would result in an increase in the amount of whale products available for household consumption, and manufacturing and selling of traditional handicrafts. The increase would come from whales the Tribe was actually able to harvest, which would likely be zero to one whale annually. Under some scenarios, the potential increase could be as high as under Alternative 2, but the more likely increase would be similar to that expected for Alternative 4.

Compared to Alternatives 2 and 3, the lower number of whales likely to be harvested would be expected to result in fewer whale products being available for household consumption and the making and selling of traditional handicrafts. The potential replacement of foods that Makah families would otherwise have to purchase and the increase in income for households that participate in the making and selling of such articles would likewise be lower.

4.6.3.5.3 Whale-watching Industry

Compared to the No-action Alternative (under which no hunts would occur and no whales would be struck, exposed to harpoon attempts, or approached by hunters), Alternative 5 would result in an increased potential for effects on whale-watching revenues or employment. The increased potential would be a product of the number of whales struck or killed (5), exposed to harpoon attempts (30), or approached (122) per year. These values could decrease to zero in years in which the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale. For the reasons provided in Subsection 4.6.2.3, Whale-watching Industry, it is unlikely that whale hunting under Alternative 5 would have more than a negligible effect on whale-watching revenues or employment within or outside the project area through any of these the scenarios described. In addition, to the extent that any such effects might occur, it is not possible to estimate the amount of decrease that might occur in revenues or employment associated with whale watching.

Compared to Alternatives 2 and 3, fewer whales could be struck or killed (5 versus 6 or 7 per year) or exposed to harpoon attempts (30 versus 36 to 42) or approaches (122 versus 353) under Alternative 5. Therefore, the potential for interactions between hunting and whale watching, or for whale hunting to affect whale behavior around whale-watching vessels, would be less than under Alternative 2 or Alternative 3.

4.6.3.5.4 Shipping and Ocean Sport/Commercial Fishing

Compared to the No-action Alternative (under which there would be no whale hunts and no activation of the MEZ), activation of the MEZ on approximately 15 days under Alternative 5 would lead to an increased potential for restrictions on the movement of commercial shipping traffic and sport and commercial fishing. Compared to Alternatives 2, 3, and 6, the reduced number of days with whale hunts (11 versus 60) would result in fewer instances of the MEZ being activated. Alternative 5 would, therefore, result in a smaller increase (relative to the No-action Alternative) in the potential for whale hunting to interfere with commercial shipping or sport and commercial fishing operations than would Alternatives 2, 3, and 6. As under Alternative 2, only minor economic impacts to commercial shipping or sport and commercial fisheries would be expected as a result of implementing Alternative 5.

Compared to Alternative 4, Alternative 5 could result in a greater increase (relative to the No-action Alternative) in the potential for whale hunting to interfere with commercial shipping or sport and commercial fishing operations. This is based on the anticipated difference in the number of days of hunting (11 versus 7). As noted above, however, the number of days when whale hunts result in MEZ activation under Alternative 5 could decrease to 0 during years in which the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale. Because hunting would not be allowed during summer, Alternative 5 would likely result in a lower potential to affect sport salmon fishing compared to Alternative 4.

4.6.3.5.5 Management and Law Enforcement

Compared to the No-action Alternative (under which no whale-hunting or associated protests would occur), Alternative 5 could result in up to 22 days of hunt-related trips and associated commitments of observers and enforcement personnel, vehicles, and equipment. The costs for hunt observers would increase (compared the No-action Alternative) by the likely number of days of hunt-related trips (22 days) for the reasons described under Alternative 2. Estimated costs for a NMFS observer for 22 days could be as high as $5,786 (NMFS 2014a) (Table 4-14) under Alternative 5, which is intermediate between the lower costs estimated for Alternative 4 and the higher costs estimated for Alternatives 2 and 3. It is uncertain whether the existing photo-identification study would continue to be funded under the No-action Alternative. If not, then its continuation under Alternative 5 could represent an increased cost beyond the No-action Alternative.

Compared to the No-action Alternative, law enforcement costs would increase by the number of days (22) when hunt-related activities (e.g., hunting, protests, and ceremonies) occurred that required a law enforcement presence. Estimated costs for all non-tribal agencies could be as high as $2 million over the course of 22 days with hunt-related trips, with the bulk of costs associated with United States Coast Guard aircraft and vessels (NMFS 2014a) (Table 4-14). Therefore, law enforcement costs under Alternative 5 would be higher than under the No-action Alternative and Alternative 4, but would likely be lower than those estimated under Alternatives 2 and 3, which have more days of hunt-related trips.

4.6.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Under Alternative 6, the waiver and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

Alternative 6 would have the same conditions as Alternative 2 regarding the hunt area, season, and methods and would, therefore, be expected to result in the same numbers of days with hunt-related trips (60) and actual hunts (33). Thus, the potential effects, relative to the No-action Alternative, on tourist-related business activity under Alternative 6 would likely be the same as those under Alternative 2. For the same reason, the potential effects on commercial shipping traffic, sport and commercial fisheries, and management and law enforcement costs under Alternative 6 would likely be the same as under Alternative 2. The following paragraphs address potential effects on 1) household consumption of whale products and manufacture and sale of traditional handicrafts and 2) the whale-watching industry.

Alternative 6 would include greater restrictions than Alternatives 2 and 3 on the maximum number of whales that could be killed per year and per 2 years, resulting in a maximum of 3.5 whales harvested per year on average. As a result, Alternative 6 would result in an increase, compared to the No-action Alternative, in the amount of whale products available for household consumption, and manufacturing and selling of traditional handicrafts. This increase would be less than under Alternatives 2 and 3 (under which a maximum of four whales could be harvested per year on average) but greater than under Alternative 4 (under which a maximum of one whale could be harvested per year under current conditions; refer to Table 4-7). The potential for increased income for households that participate in the making and selling of traditional handicrafts would be smaller than under Alternative 2, although greater than under the No-action Alternative.

Under Alternative 6, no more than four whales could be struck or killed per year, and no more than seven whales could be struck or killed over 2 years. Approximately 21 whales would be exposed to harpoon attempts and 353 would be approached annually. These estimates are less than or equal to those for Alternative 2 (under which up to 7 whales may be struck annually, 42 exposed to unsuccessful harpoon attempts, and 353 approached). As a result, the potential for Alternative 6 to result in a change in revenues or employment associated with whale watching, compared to the No-action Alternative, would likely be slightly lower than the potential described for Alternative 2. For the reasons provided in Subsection 4.6.2.3, Whale-watching Industry, it is unlikely that whale hunting under Alternative 6 would have more than a negligible effect on whale-watching revenues or employment within or outside the project area through any of the scenarios described. In addition, to the extent that any such effects might occur, it is not possible to estimate the amount of decrease that might occur in revenues or employment associated with whale watching.

Table 4-14. Estimated costs of enforcement-related activities and resources.

Entity	Unit Cost	No-action Alternative		Alternatives 2, 3 & 6		Alternative 4		Alternative 5	
		Freq.	Cost	Freq.	Cost	Freq.	Cost	Freq.	Cost
U.S. Coast Guard	$86,068 per day	*	*	60 days	$5.2 million	7 days	$602,476	22 days	$1.9 million
Washington Department of Fish and Wildlife Police	$1,427 per day	*	*	60 days	$85,620	7 days	$9,989	22 days	$31,394
Clallam County Sheriff	$2,089 per day	*	*	60 days	$125,340	7 days	$14,623	22 days	$45,958
NMFS Enforcement and Monitoring	$2,086 per day	*	*	60 days	$125,160	7 days	$14,602	22 days	$45,892
NMFS Gray Whale Monitoring	$75,000 per year	*	*	Annual	$75,000	Annual	$75,000	Annual	$75,000
Total Annual Costs (rounded)		*		**$5.6 million**		**$717,000**		**$2.1 million**	

Estimates derived from (NMFS 2014a). Freq. = Frequency ; * = Assumes no change from existing costs.

4.7 Environmental Justice

4.7.1 Introduction

Executive Order 12898, *Environmental Justice*, requires that federal agencies "identify and address the . . . disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Based on assessment of the demographic data presented in Subsection 3.7, Environmental Justice, and preliminary analysis of the type and location of effects potentially resulting from the proposed action, the potential population of concern for this environmental justice analysis consists of members of the Makah Tribe, who are a Native American population. As described in Subsection 3.7, Environmental Justice, this is a low-income, as well as a minority, population.

4.7.2 Evaluation Criteria

The EPA Office of Civil Rights and Environmental Justice developed guidance for all federal agencies conducting environmental justice analyses. This environmental justice analysis follows the EPA guidelines that offer a range of categories to indicate the presence or absence of environmental justice effects (EPA 1998; EPA 2010). This evaluation draws topically from the range of indicator categories EPA (1998) outlined. These categories correspond to effects described in Subsection 4.6, Economics, Subsection 4.8, Social Environment, and Subsection 4.10, Ceremonial and Subsistence Resources, of this EIS. The EPA environmental justice guidelines also indicate that impacts on human health should be considered in environmental justice analyses. As discussed in Subsection 4.16, Human Health, available information is insufficient to assess the potential of any of the alternatives to affect human health, either positively or negatively.

Analyses in this subsection also do not address the potential for the alternatives to affect the safety of Makah tribal members, because environmental justice contemplates impacts imposed on minority and low-income populations by a federal agency. The proposed action is based on the Tribe's MMPA waiver request and the other action alternatives include variations on the restrictions identified in the Tribe's request. Risks associated with whale hunting would be undertaken voluntarily by the Tribe. The safety of hunt participants and others is addressed in Subsection 4.15, Public Safety. Authorization of a whale hunt under the action alternatives would likely result in some level of whale hunting activity by Makah tribal members, increasing the potential for hunt-related injury above the current level of injury under the No-action Alternative.

This analysis was based on a qualitative assessment of adverse effects that would result from the proposed alternatives for each of the three resource areas evaluated. A determination of an environmental justice impact would occur if these adverse effects were to have a disproportionate effect on the environmental justice population of concern. A disproportionately high and adverse effect on minority and low-income populations means an adverse effect that 1) is predominantly borne by a minority population and/or a low-income population, or 2) will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

For each alternative, the analysis considers potential effects related to economics, ceremonial and subsistence resources, and social environment. Economic effects would be related to tourism, which would be affected by the number of days per year with hunt-related trips, and household consumption of whales, which would be affected by the number of whales harvested (similar to the analyses in Subsection 4.6, Economics). Effects on ceremonial and subsistence resources and the social environment would be related to whether whale hunting is denied or allowed.

4.7.3 Evaluation of Alternatives

The following subsections compare the potential for the alternatives to affect conditions in the project area as they pertain to environmental justice. For each alternative, the discussion addresses the potential economic, ceremonial and subsistence resources, social environment, and human health effects on the Makah Tribe and other low-income or minority populations.

Business activity at tourist-related enterprises in Neah Bay generates jobs and income for tribal members (Subsection 3.6.3.2.4, Contribution of Tourism to the Local Economy). As described in

Subsection 4.6.2.1, Tourism, whale hunts may create short-term increases in tourist-related business activity during a whale hunt. A whale hunt may also create an opportunity over the long term for the Tribe to attract visitors to Neah Bay who are interested in observing traditional cultural activities. On the other hand, hunting could also lead to boycott attempts by whale-hunting opponents, which could reduce the number of visitors to Neah Bay. If, on balance, the absence of a whale hunt resulted in less tourism-related business activity in Neah Bay (compared to the action alternatives), a disproportionate share of the adverse economic effects would fall on the Makah Tribe.

Potential short-term increases (relative to the No-action Alternative) in business activity for tourist-related enterprises on the Makah Reservation would likely be higher under Alternatives 2, 3, and 6 compared to Alternatives 4 and 5 because hunt-related trips would be expected to occur on approximately 60 days per year under Alternatives 2, 3, and 6. Hunt-related trips would be expected to occur on approximately 22 days per year under Alternative 5 and only 7 days per year under Alternative 4. Increases in business activity on days with hunt-related activity could be higher under Alternative 4 than under the other action alternatives, however, because hunts would likely occur during the summer when tourist activity is higher than during April and May (when most hunting would likely occur under the other action alternatives). Regarding the Tribe's ability to attract more visitors over the longer term because of a hunt, all of the action alternatives are likely to have an equal effect, compared to the No-action Alternative.

Under the No-action Alternative, no freshly harvested whale products would be available to Makah households. The quantity of whale products available to Makah households for consumption and the making and selling of handicraft articles would be limited to drift whales or whales taken incidentally in fisheries. A disproportionate share of these adverse effects would fall upon the Makah Tribe, which would have been the primary users of such products. Lack of such products would make largely unavailable a traditional subsistence resource for household members and the Makah community as a whole.

Based on the likely number of whales that would be successfully harvested per year (Table 4-1), the amount of edible and non-edible whale products that would become available would probably be greater under Alternatives 2 and 3 than under the other action alternatives. Compared to Alternative 2, however, it is less likely that the Tribe would be able to harvest an average of four whales per year under Alternative 3 because of limits on PCFG whale mortality. The likely number of whales harvested under Alternative 6 would be slightly lower (3.5 compared to 4) and, similar to Alternative 3, could be further constrained by the limit on PCFG whale mortality. The number of whales that could be harvested under Alternative 4 would be limited to one per year under current conditions. It is possible, however, that no whales could be harvested in some years if tribal hunters are unable to locate and strike a known ENP male or if a whale is struck and lost (in which case, the hunt would be ended for the year). Based on the constraints imposed by the hunting season and the PCFG mortality limit under Alternative 5, it is expected that the Tribe would harvest up to one whale per year, although the maximum limit would be five, as under Alternatives 2 and 3.

Under the No-action Alternative, subsistence and cultural activities related to whale hunting (e.g., preparation, hunting, butchering, sharing, consuming, dancing, singing, and rituals) would be more limited than under the action alternatives. A disproportionate share of the adverse effects on subsistence uses, traditional knowledge and activities, spiritual connection to whale hunting, and cultural identity would fall upon the Makah Tribe. The Makah's stated need for the whale hunt is to allow the Tribe to exercise its treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions. Alternatives 3, 4, 5, and 6 would have the positive ceremonial and subsistence effects associated with a resumption of Makah whale hunting, but would restrict whale hunting in various ways that might make these benefits lower than under Alternative 2.

Under the No-action Alternative, the benefits to the social environment (for example, community cohesion) that the Makah Tribe attributes to whale hunting would not be realized, potentially increasing social tension within the Makah Tribe. To the extent they occurred, these adverse social impacts would be borne predominantly by Makah tribal members. Other treaty tribes could view NMFS' action under the No-action Alternative as a breach of faith by the United States government in upholding treaty rights, depending on the reasons for the denial of the request. Any social tension created by this perception would not fall equally on all populations, but would predominantly be borne by Native Americans. Under any of the action alternatives, the social benefits that the Makah Tribe attributes to whale hunting would be realized; however, whale hunts would also probably exacerbate the social tensions between tribal members who do and those who do not support the hunt. There is insufficient information to determine whether the potential social benefits to the Makah Tribe would offset the potential adverse social effects. Consequently, it is not possible to determine if the action alternatives would result in disproportionately high and adverse social effects on the Makah Tribe. Under any of the action alternatives, official recognition that traditional activities such as whale hunting are culturally valuable, despite their controversial nature, could be reassuring to Native Americans in general.

4.7.3.1 Alternative 1, No Action

4.7.3.1.1 Economics

Under the No-action Alternative, no whale hunt would be permitted and there would be no short-term increases in business activity as visitors come to Neah Bay to view hunt-related activities or to participate in harvest-related celebrations. In addition, there be no potential for media coverage of the whale hunt to generate interest in the Makah Reservation as a cultural tourism destination. As a result, this alternative might limit the long-term opportunities for the Makah to expand the tribal tourism sector of the reservation economy. On the other hand, under the No-action Alternative it is unlikely there would be attempts to boycott Neah Bay because of whale hunting. If, on balance, the absence of a whale hunt under the No-action Alternative resulted in less tourism-related business activity in Neah Bay (compared to under the action alternatives), a disproportionate share of these adverse effects might fall on the Makah Tribe.

With the possible exception of products from drift whales or whales incidentally caught in fisheries, there would be no potential for households to consume whale meat and blubber or use non-edible whale products for the manufacture and sale of traditional handicrafts. The potential for households to gain additional income from making and selling traditional handicrafts would not be realized. As noted in Subsection 3.7.3.3.3, Makah Tribe, Native Americans living on the Makah Reservation have substantially lower incomes and experience higher poverty rates than residents throughout Clallam County. The adverse impact of this unrealized household income would be borne predominantly by Makah households. The Makah households would principally use the whale products to provide a traditional subsistence resource to household members and the wider Makah community and to derive income from the manufacture and sale of traditional native handicrafts.

4.7.3.1.2 Ceremonial and Subsistence Resources

Under the No-action Alternative, some subsistence and cultural activities related to whale hunting (e.g., preparation, hunting, butchering, sharing, consuming, dancing, singing, and rituals) would not be expected to occur. A disproportionate share of the adverse effects on subsistence uses, traditional knowledge and activities, spiritual connection to whale hunting, and cultural identity would fall upon the Makah Tribe. The Makah's stated need for the whale hunt is to allow the Tribe to exercise treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions.

4.7.3.1.3 Social Environment

Under the No-action Alternative, the benefits to the social environment (for example, community cohesion) that the Makah Tribe attributes to whale hunting would not be realized, potentially increasing social tension within the Makah Tribe. To the extent that they would occur, these adverse social impacts would be borne predominantly by members of the Makah Tribe. Other treaty tribes could view NMFS' action under the No-action Alternative as a breach of faith by the United States government in upholding treaty rights, depending on the reasons for the denial of the request. Any social tension created by this perception would not fall equally on all populations, but would predominantly be borne by Native Americans.

4.7.3.2 Alternative 2, Tribe's Proposed Action

4.7.3.2.1 Economics

In comparison to the No-action Alternative, a whale hunt would be allowed and there could be 60 days with hunt-related trips per year, resulting in a minor increase in the level of business activities of tourist-related enterprises in and around the project area. Over the longer term, the Tribe would have opportunities to bolster the tribal tourism sector of the reservation economy, as media stories would increase public awareness of the Makah whale hunt and the Tribe's whale hunting tradition. Boycott attempts, however, could reduce any long term benefits from tourism.

Compared to the No-action Alternative, the potential for whale products to become available to Makah households for consumption and the making and selling of handicraft articles would increase (up to four whales per year on average) as a result of the resumption of Makah whale hunting. The increased potential for whale products to become available for household consumption and the making and selling of traditional handicraft articles would have a beneficial effect on Makah households.

4.7.3.2.2 Ceremonial and Subsistence Resources

In contrast to the No-action Alternative, Alternative 2 would have multiple positive ceremonial and subsistence effects on the Makah Tribe associated with a resumption of whale hunting. Alternative 2, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt, which is to allow the Tribe to exercise its treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions.

4.7.3.2.3 Social Environment

In contrast to the No-action Alternative, the benefits to the social environment (for example, increased social bonding within the Makah Tribe) that the Tribe attributes to whale hunting would be realized. However, social tensions exist between tribal members who support the hunt and those who do not. Whale hunts under Alternative 2 would probably exacerbate these tensions. There is insufficient information to determine whether the potential social benefits to the Makah Tribe would offset the potential adverse social effects. Consequently, it is impossible to determine if Alternative 2 would result in disproportionately high and adverse social effects.

Alternative 2 would make it possible for the Tribe to carry on traditional whale hunting that is sanctioned by the IWC. In contrast to the No-action Alternative, official recognition that traditional activities such as whale hunting are culturally valuable, despite their controversial nature, would likely be reassuring to Native Americans in general.

4.7.3.3 Alternative 3, Offshore Hunt

4.7.3.3.1 Economics

In comparison to the No-action Alternative, there could be a minor increase, as under Alternative 2, in the level of business activities of tourist-related enterprises in and around the project area. Over the longer term, the Tribe would have opportunities to bolster the tribal tourism sector of the reservation economy, as media stories would increase public awareness of the Makah whale hunt and the Tribe's whale hunting traditions. Boycott attempts, however, could reduce any long-term benefits from tourism.

Compared to the No-action Alternative, the potential for whale products to become available to Makah households for consumption and the making and selling of handicraft articles would increase as a result of the resumption of Makah whale hunting. The increased potential for whale products to become available for household consumption and the making and selling of traditional handicraft articles would have a beneficial effect on Makah households.

Compared to Alternative 2, Alternative 3 would be expected to result in the same number of days with hunt-related trips (60) on which there could be increased business activity caused by an influx of visitors. In contrast to Alternative 2, it is possible that hunting activities in some years could be curtailed before any whales are successfully harvested. Compared to Alternative 2, therefore, it is less likely that the Tribe would be able to harvest an average of four whales per year under Alternative 3. Alternative 3 could thus have a smaller increase (relative to the No-action Alternative) in the amount of whale products available for household consumption, and manufacturing and selling of traditional handicrafts than would Alternative 2.

4.7.3.3.2 Ceremonial and Subsistence Resources

In contrast to the No-action Alternative, Alternative 3 would have multiple positive ceremonial and subsistence effects on the Makah Tribe associated with a resumption of whale hunting. Alternative 3, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt, which is to allow the Tribe to exercise its treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions.

Compared to Alternative 2, limits on PCFG whale mortality under Alternative 3 could reduce the total number of whales harvested in some years. Under some scenarios, it is possible that hunting activities for a given year could be curtailed before any whales are successfully harvested. In addition, Makah hunters would be prohibited from making an initial strike on a gray whale within 5 miles (8 km) of shore. Consequently, the positive ceremonial and subsistence effects that the Makah would experience as a result of a resumption of whale hunting could be smaller under Alternative 3 than under Alternative 2. Alternative 3, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt.

4.7.3.3.3 <u>Social Environment</u>

In contrast to the No-action Alternative, the benefits to the social environment (for example, increased social bonding within the Makah Tribe) that the Tribe attributes to whale hunting would be realized. However, social tensions exist between tribal members who support the hunt and those who do not. Whale hunts under Alternative 3 would probably exacerbate these tensions. There is insufficient information to determine whether the potential social benefits to the Makah Tribe would offset the potential adverse social effects. Consequently, it is impossible to determine if Alternative 3 would result in disproportionately high and adverse social effects.

Alternative 3 would make it possible for the Tribe to carry on traditional whale hunting that is sanctioned by the IWC. In contrast to the No-action Alternative, official recognition that traditional activities such as whale hunting are culturally valuable, despite their controversial nature, would likely be reassuring to Native Americans in general.

The amount of social benefit the Makah Tribe experiences under Alternative 3 would probably be the same as under Alternative 2.

4.7.3.4 Alternative 4, Summer/Fall Hunt

4.7.3.4.1 <u>Economics</u>

In comparison to the No-action Alternative, there could be a minor increase, as under Alternative 2, in the level of business activities of tourist-related enterprises in and around the project area. Over the longer term, the Tribe would have opportunities to bolster the tribal tourism sector of the reservation economy, as media stories would increase public awareness of the Makah whale hunt and the Tribe's whale hunting traditions. Boycott attempts, however, could reduce any long-term benefits from tourism.

Compared to the No-action Alternative, the potential for whale products to become available to Makah households for consumption and the making and selling of handicraft articles would increase as a result of the resumption of Makah whale hunting. The increased potential for whale products to become available for household consumption and the making and selling of traditional handicraft articles would have a beneficial effect on Makah households.

Compared to Alternative 2, Alternative 4 would be expected to result in fewer days with hunt-related trips (7) on which there could be increased business activity caused by an influx of visitors. In addition, the maximum number of whales struck or harvested would be limited to one ENP male whale per year under current conditions. Alternative 4 would thus have a smaller increase (relative to the No-action Alternative) in the amount of whale products available for household consumption, and manufacturing and selling of traditional handicrafts than would Alternative 2.

4.7.3.4.2 Ceremonial and Subsistence Resources

In contrast to the No-action Alternative, Alternative 4 would have multiple positive ceremonial and subsistence effects on the Makah Tribe associated with a resumption of whale hunting. Alternative 4, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt, which is to allow the Tribe to exercise its treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions.

Under Alternative 4, the maximum number of whales struck or harvested would be limited to one ENP male whale per year under current conditions. Consequently, the positive ceremonial and subsistence effects that the Makah would experience as a result of a resumption of whale hunting could be smaller under Alternative 4 than under Alternatives 2 and 3, under which 3.5 to 4 whales could be harvested per year. Alternative 4, like the other action alternatives, would nevertheless be consistent with the Makah's stated need for the whale hunt.

4.7.3.4.3 Social Environment

In contrast to the No-action Alternative, the benefits to the social environment (for example, increased social bonding within the Makah Tribe) that the Tribe attributes to whale hunting would be realized. However, social tensions exist between tribal members who support the hunt and those who do not. Whale hunts under Alternative 4 would probably exacerbate these tensions. There is insufficient information to determine whether the potential social benefits to the Makah Tribe would offset the potential adverse social effects. Consequently, it is impossible to determine if Alternative 4 would result in disproportionately high and adverse social effects.

Alternative 4 would make it possible for the Tribe to carry on traditional whale hunting that is sanctioned by the IWC. In contrast to the No-action Alternative, official recognition that traditional activities such as whale hunting are culturally valuable, despite their controversial nature, would likely be reassuring to Native Americans in general.

Under Alternative 4, the maximum number of whales struck or harvested would be limited to one ENP male whale per year under current conditions (refer to Table 4-7). Consequently, there would be fewer occasions for hunt-related social interactions compared to Alternatives 2 and 3, under which up to 4 whales could be harvested per year.

4.7.3.5 Alternative 5, Split-season Hunt

4.7.3.5.1 Economics

In comparison to the No-action Alternative, there could be a minor increase, as under Alternative 2, in the level of business activities of tourist-related enterprises in and around the project area. Over the longer term, the Tribe would have opportunities to bolster the tribal tourism sector of the reservation economy, as media stories would increase public awareness of the Makah whale hunt and the Tribe's whale hunting traditions. Boycott attempts, however, could reduce any long term benefits from tourism.

Compared to the No-action Alternative, the potential for whale products to become available to Makah households for consumption and the making and selling of handicraft articles would increase as a result of the resumption of Makah whale hunting. The increased potential for whale products to become available for household consumption and the making and selling of traditional handicraft articles would have a beneficial effect on Makah households.

Compared to Alternatives 2 and 3, Alternative 5 would be expected to result in fewer days with hunt-related trips (22 versus 60) on which there could be increased business activity caused by an influx of visitors. In contrast, Alternative 5 would have approximately three times as many days with hunt-related trips compared to Alternative 4. Based on the constraints imposed by the hunting season and the PCFG mortality limit, it is expected that the Tribe would harvest up to one whale per year, although the maximum allowable limit would be greater (Subsection 4.1.5, Alternative 5). Thus, the maximum possible increase (relative to the No-action Alternative) in the amount of whale products available for household consumption, and manufacturing and selling of traditional handicrafts under Alternative 5 would be similar to that anticipated under Alternative 2, although the actual increase would likely be much smaller.

4.7.3.5.2 Ceremonial and Subsistence Resources

In contrast to the No-action Alternative, Alternative 5 would have multiple positive ceremonial and subsistence effects on the Makah Tribe associated with a resumption of whale hunting. Alternative 5, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt, which is to allow the Tribe to exercise its treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions.

Under Alternative 5, hunting would be restricted to two 3-week periods in December and May each year. In addition, the landing of a single PCFG whale, or the striking and losing of a single whale, would end the hunt for any given year. Consequently, the positive ceremonial and subsistence effects that the Makah would experience as a result of a resumption of whale hunting could be smaller under Alternative 5 than under Alternatives 2, 3, and 6, under which 3.5 to 4 whales could be harvested per year. Alternative 5, like the other action alternatives, would nevertheless be consistent with the Makah's stated need for the whale hunt.

4.7.3.5.3 Social Environment

In contrast to the No-action Alternative, the benefits to the social environment (for example, increased social bonding within the Makah Tribe) that the Tribe attributes to whale hunting would be realized. However, social tensions exist between tribal members who support the hunt and those who do not. Whale hunts under Alternative 5 would probably exacerbate these tensions. There is insufficient information to determine whether the potential social benefits to the Makah Tribe would offset the potential adverse social effects. Consequently, it is impossible to determine if Alternative 5 would result in disproportionately high and adverse social effects.

Alternative 5 would make it possible for the Tribe to carry on traditional whale hunting that is sanctioned by the IWC. In contrast to the No-action Alternative, official recognition that traditional activities such as whale hunting are culturally valuable, despite their controversial nature, would likely be reassuring to Native Americans in general.

The amount of social benefit the Makah Tribe experiences under Alternative 5 would probably be the same as under Alternatives 2, 3, and 4.

4.7.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

4.7.3.6.1 Economics

Alternative 6 would have the same conditions as Alternative 2 regarding the hunt area, season, and methods and would, therefore, be expected to result in the same number of days with hunt-related trips.

For this reason, in both the short term and the long term, the potential effects, relative to the No-action Alternative, on tourist-related business activity under Alternative 6 would likely be the same as those under Alternative 2.

Like Alternatives 2 and 3, Alternative 5 would be expected to result in 60 days per year of hunt-related trips on which there could be increased business activity caused by an influx of visitors. This increased activity could be substantially greater than under Alternatives 4 and 5, which would likely have fewer days with hunt-related trips (7 and 11 days, respectively). Alternative 6 would include greater restrictions than Alternative 2 on the maximum number of whales that could be killed per year and per 2 years, resulting in a maximum of 3.5 whales harvested per year on average. As a result, Alternative 6 would result in an increase, compared to the No-action Alternative, in the amount of whale products available for household consumption, and manufacturing and selling of traditional handicrafts. This increase would be less than under Alternatives 2, 3, and 5 (under which a maximum of five to seven whales could be harvested in a given year) but greater than under Alternative 4 (under which a maximum of one whale could be harvested per year under current conditions). The potential for replacement of foods that Makah families would otherwise have to purchase and increased income for households that participate in the making and selling of traditional handicrafts would be smaller than under Alternative 2, although greater than under the No-action Alternative.

4.7.3.6.2 Ceremonial and Subsistence Resources

In contrast to the No-action Alternative, Alternative 6 would have multiple positive ceremonial and subsistence effects on the Makah Tribe associated with a resumption of whale hunting. Alternative 6, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt, which is to allow the Tribe to exercise its treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions.

Compared to Alternative 2, limits on the maximum number of whales that could be killed per 2 years would result in fewer whales harvested, on average, per year. Consequently, the positive ceremonial and subsistence effects that the Makah would experience as a result of a resumption of whale hunting could be smaller under Alternative 6 than under Alternatives 2, 3, and 5, but greater than under the No-action Alternative or Alternative 4. Alternative 6, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt.

4.7.3.6.3 Social Environment

In contrast to the No-action Alternative, the benefits to the social environment (for example, increased social bonding within the Makah Tribe) that the Tribe attributes to whale hunting would be realized.

However, social tensions exist between tribal members who support the hunt and those who do not. Whale hunts under Alternative 6 would probably exacerbate these tensions. There is insufficient information to determine whether the potential social benefits to the Makah Tribe would offset the potential adverse social effects. Consequently, it is impossible to determine if Alternative 6 would result in disproportionately high and adverse social effects.

Alternative 6 would make it possible for the Tribe to carry on traditional whale hunting that is sanctioned by the IWC. In contrast to the No-action Alternative, official recognition that traditional activities such as whale hunting are culturally valuable, despite their controversial nature, would likely be reassuring to Native Americans in general.

The ability to resume hunting gray whales under Alternative 6 would probably result in the Makah Tribe experiencing the same amount of social benefit as under Alternatives 2, 3, 4, and 5.

4.8 Social Environment

4.8.1 Introduction

This subsection addresses the potential for the alternatives to affect the social environment of the Makah Tribe, other tribes, and the general public. As described in Subsection 3.8, Social Environment, various groups and individuals either oppose or support the Makah whale hunt. Makah tribal members and other tribes generally support the hunt, while feelings among the general public are more mixed, with many adamantly opposing the hunt. NMFS' denial of a whale hunt under the No-action Alternative could create tension on the part of the Makah and other Indian tribes toward whale hunting opponents and the federal government, depending on the reasons for a denial. Conversely, a decision to authorize a whale hunt, and subsequent hunting, could lead to tensions on the part of whale hunting opponents towards the Makah and other Indian tribes and the federal government. Regardless of the decision, like-minded groups could experience moments of increased social bonding.

4.8.2 Evaluation Criteria

Any of the alternatives could affect relationships and interactions among members of the Makah Tribe, other tribes, and the general public. These effects would be expressed to varying degrees as social tension or social bonding, depending on the feelings of individual group members about whale hunting. The criteria for determining the potential effects of the alternatives on the social environment are primarily qualitative and based on the anticipated magnitude and duration of changes in social tensions or social bonding. The amount and content of media coverage might intensify protests and local social tensions. The following three subsections describe how social interactions within and among the three interest groups identified in Subsection 3.8, Social Environment, might be affected under the alternatives.

4.8.2.1 Makah Tribal Members

As noted in Subsection 3.10.3.5.1, Makah Whaling, the 1999 whale hunt appeared to bolster social accord within the Makah community. Participants in the hunt reported enduring intense physical and spiritual training, which culminated in a deep bond between whalers (Subsection 3.10.3.5, Contemporary Makah Society). More broadly, most tribal members believe that restoration of whale hunting improved social and cultural conditions on the reservation (Subsection 3.8.3.1, Makah Tribal Members). Based on these experiences, as well as the potential benefits associated with reinforcing cultural identity (Subsection 4.10, Ceremonial and Subsistence Resources), whale hunts under the action alternatives could increase social bonding within the Tribe (relative to the No-action Alternative). Conversely, a decision to deny the Tribe's request to hunt whales could lead to feelings of resentment toward the federal government by those tribal members who support the hunt, depending on the reason for the denial (Subsection 4.10, Ceremonial and Subsistence Resources [Alternative 1, No Action].

A whale hunt might also generate social tension between tribal members who support the hunt and those who do not. Whale hunts under the action alternatives would probably exacerbate tensions (relative to the No-action Alternative), which might be expressed as vocal dissent and public or private criticism of tribal members who speak out against the hunt.

Under the action alternatives, tension would also increase between tribal members who support the hunt and individuals or group members (including some members of other tribes) who oppose the hunt. As mentioned in Subsection 3.8.3.1, Makah Tribal Members, tribal members have expressed frustration with protesters and others who oppose the hunt, and some engaged in physical conflicts with protesters during the previous hunts.

4.8.2.2 Other Tribes

Many native organizations have expressed support for Makah whale hunting. In addition, some members of other regional tribes have stated the importance of solidarity with the Makah (Subsection 3.8.3.2, Other Tribes). Following the successful hunt in 1999, members of other tribes attended a community potlatch hosted by the Makah, witnessing the proceedings and sharing food. Whale hunts under the action alternatives (relative to the No-action Alternative) would probably increase social bonding between the Makah and other native groups in the region, the United States, and worldwide. At the same time, members of other tribes might be subject to anti-whaling and anti-Indian sentiments expressed by whaling opponents. Similar to the Makah, other tribes might respond to the No-action Alternative with reinforced feelings of disillusionment with the federal government.

4.8.2.3 Other Individuals and Organizations

Subsection 3.8.3.3, Other Individuals and Organizations, describes the range of attitudes about Makah whale hunting held by people locally, statewide, nationally, and internationally, as well as people affiliated with various organizations. Those expressing support for the Makah gray whale hunt have mentioned treaty rights, the relative health of the gray whale population, and the cultural meaning ascribed to whaling by the Makah. Opponents of the hunt have commented on their perceptions of the beauty, intelligence, and community structure of whales; the existence value of gray whales (collectively and individually); the pain individual whales experience if struck or killed in a hunt; and the possibility that the local economy might be impacted by a boycott in response to a whale hunt. Organizations that oppose whaling in general include animal-rights and marine conservation organizations, the whale-watching industry, and anti-treaty constituents.

Based on the experience of previous hunts, whale hunting under the action alternatives would inspire a wide range of feelings among persons and groups who oppose the hunt, including sorrow, frustration, and anger (Subsection 3.8.3.3, Other Individuals and Organizations). These feelings would be based on the concerns listed above, among others. Experience from the hunts and hunt exercises in 1998, 1999, and 2000 indicates that the resulting tensions might be expressed through demonstrations, attempts to interfere with hunt activities, or other forms of protest. These expressions might be directed at Makah tribal members, other tribes, and other individuals and organization members who have expressed support for the Makah whale hunt. Several incidents involving violent or near-violent confrontations between hunt opponents and tribal members occurred before and during the previous hunts (Subsection 3.8.3.3, Other Individuals and Organizations). Other expressions of tension that followed the successful 1999 hunt included death threats and anti-whaling messages delivered to tribal members and the Coast Guard, as well as incidents of Makah tribal members being refused service in area businesses. Some expressions of social tension directed at the Makah are founded in racism and anti-Indian sentiment, as well as resentment over the previous whale hunts. Such expressions would likely continue under all of the alternatives, including the No-action Alternative.

Relative to the No-action Alternative, a whale hunt could also increase social bonding among whaling opponents through a sense of shared adversity and a common cause. Under the No-action Alternative, hunt opponents might bond by celebrating a decision not to issue a permit. Similarly, supporters of the Makah gray whale hunt may bond through celebration under the action alternatives and through shared frustration under the No-action Alternative.

4.8.3 Evaluation of Alternatives

The following subsections consider the potential for the alternatives to affect the social environment of the Makah Tribe, other tribes, and the general public. Under the action alternatives, each hunt attempt would probably result in protests and media coverage, with the associated effects described above under Subsection 4.8.2, Evaluation Criteria. Most protest activities and vocal opposition to the hunt have come from groups that have expressed opposition to whale hunting under any conditions. For example, the website of one of the most active protest organizations states, "Whales should not be slaughtered anytime or anywhere by any people. These are socially complex, intelligent mammals whose numbers worldwide have been diminished severely" (Sea Shepherd Conservation Society 2007). It is possible that restrictions on the total number of whales harvested, or on the number of identified whales harvested, would reduce the amount and intensity of opposition to a hunt. No information is available that would allow a prediction of the difference in social tensions under alternatives that would place limits on harvest of identified whales versus those that would not. This analysis therefore treats the potential type and magnitude of effects on the social environment as depending on whether hunting occurs, the number of days with hunt-related trips, and the amount and content of associated media coverage. Alternatives that include more hunting expeditions would provide opportunities for more expression of social tension among those with opposing viewpoints, as well as added opportunities for increased bonding among persons sharing similar viewpoints.

As noted in Subsection 3.8.3.3, Other Individuals and Organizations, many people who watch whales in the project area on a regular basis attach existence values to individual PCFG whales that regularly visit the area. It is possible that these people may express greater opposition to alternatives that allow greater numbers of PCFG whales to be killed per year or that would explicitly target identified PCFG whales.

The lowest risk of adverse effects on the social environment would occur under the No-action Alternative, because no whale hunts would be permitted and there would be fewer occasions for confrontation between supporters and opponents of whale hunting compared to any of the action alternatives. Under all of the action alternatives, whale hunts would result in episodes of increased social tension between hunt supporters and opponents. Each hunt would be expected to result in increased tension as well as increased opportunities for social bonding between like-minded observers, compared to the No-action Alternative. The number of occasions that social tensions would likely exceed conditions under the No-action Alternative would likely correspond to the number of days with hunt-related trips under each alternative. The greatest number of days with hunt-related trips (60) would be expected to occur under Alternatives 2, 3, and 6. Hunt-related trips would be expected to occur on 22 days under Alternative 5 and on 7 days under Alternative 4. Among the action alternatives, therefore, Alternative 4 would have the lowest risk of adverse effects on the social environment, Alternative 5 would have a moderate risk, and Alternatives 2, 3, and 6 would have the greatest risk, based on the number of occasions of elevated tension because of whale hunting. Also, under Alternative 6, the waiver and implementing regulations would lapse after 10 years and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

The alternative with the lowest potential of providing benefits to Makah tribal members through social bonding would be the No-action Alternative. Any of the action alternatives would provide some potential for benefits to tribal members through social bonding.

4.8.3.1 Alternative 1, No Action

Under the No-action Alternative, no whale hunt would be permitted, and no whale hunting or associated activities (e.g., ceremonies, celebrations, protests, or law enforcement) would be anticipated. Individuals and organizations who oppose the Makah gray whale hunt would not engage in demonstrations, attempts to interfere with hunt activities, or other forms of protest. There would, therefore, be no potential for episodes of increased social tensions associated with a whale hunt. Supporters of the Makah whale hunt might bond through a sense of shared adversity and a common cause, and hunt opponents (including some Makah tribal members) might bond by celebrating a decision not to authorize a hunt. Similarly, social bonding and other potential social benefits within the Makah Tribe described above and in Section 3 would not be realized under the No-action Alternative. Renker (2012) cited observations of a connection between unhealthy social behaviors and the inability to practice traditional rituals. Such behaviors could become more common among Makah tribal members. In addition, the Makah and other tribes might feel continued tension toward hunt opponents and the federal government, in part because of anger over a perceived lack of respect for tribal traditions and treaty rights.

4.8.3.2 Alternative 2, Tribe's Proposed Action

Any whale hunts that occurred under Alternative 2 would result in increased tension between hunt supporters and opponents, compared to the No-action Alternative. As discussed in Subsection 4.8.2, Evaluation Criteria, the potential type and magnitude of effects on the social environment would likely be affected by the number of hunting expeditions. As described in Subsection 4.1, Introduction, there would likely be approximately 60 days with hunt-related trips per year under Alternative 2. The degree of tension expressed by some hunt opponents might also be affected by the number of PCFG whales that could be killed. The maximum number of PCFG whales that could be killed per year under Alternative 2 would be 6, although the actual number would likely be 2.8 (Table 4-1).

Supporters and opponents would be drawn from all three of the interest groups (i.e., Makah tribal members, other tribes, and other individuals and organizations) described above and in Subsection 3.8.3, Existing Conditions. The reactions of individual members of interest groups would be determined primarily by each person's set of values and beliefs. Members of specific organizations, which are generally made up of people who share similar values and beliefs, would likely express similar reactions. Members of local communities and Indian tribes (including the Makah) would be more likely to differ from one another, because those groups are based on cultural, geographical, or familial ties instead of particular belief systems.

Individuals and organizations who oppose the Makah gray whale hunt may engage in demonstrations, attempts to interfere with hunt activities, or other forms of protest. Some tribal members or other hunt supporters may engage in confrontations with protesters. Social tensions might be expressed as described above or in other ways.

4.8.3.3 Alternative 3, Offshore Hunt

Alternative 3 would likely result in the same number of days with hunt-related trips as Alternative 2 and would, therefore, result in the same number of opportunities for the expression of social tension as under Alternative 2, and more opportunities relative to the No-action Alternative. The degree of tension expressed by some hunt opponents might also be affected by the number of PCFG whales that could be killed. The maximum number of PCFG whales that could be killed per year under Alternative 3 would be 3, although the actual number would likely be 1.2 (Table 4-1). Thus, there would be a lower potential for social tension regarding the killing of PCFG whales than under Alternative 2, and greater potential relative to the No-action Alternative.

4.8.3.4 Alternative 4, Summer/Fall Hunt

Alternative 4 would likely result in fewer days with hunt-related trips than Alternatives 2 and 3 (7 compared to 60) and would, therefore, result in fewer opportunities for the expression of social tension than under those alternatives, but more opportunities relative to the No-action Alternative. As under the other action alternatives, the degree of tension expressed by some hunt opponents might also be affected by the number of PCFG whales that could be killed. The potential number of ENP whales killed under Alternative 4 would be determined by the PCFG limit, which would be one under current conditions (refer to Table 4-7), and any whale struck would be counted as a PCFG whale. (Because Alternative 4, like Alternative 2, would allow seven strikes per year, the number of ENP whales potentially killed could be as high as seven, but this would require the PCFG abundance to more than triple, which is highly unlikely). Thus, while the potential for social tension regarding the killing of PCFG whales would be greater than under the No-action Alternative, the potential could be less than under Alternatives 2 and 3. On the other hand, under Alternative 4, tribal hunters would deliberately hunt whales that are likely to be PCFG males. As noted in Subsection 3.8.3.3, Other Individuals and Organizations, many people who watch whales in the project area on a regular basis attach existence values to individual PCFG whales that regularly visit the area. A hunt targeting these whales could increase the social tension within this group beyond the tension that would exist under Alternatives 2 or 3.

4.8.3.5 Alternative 5, Split-season Hunt

Alternative 5 would likely result in fewer days with hunt-related trips than Alternatives 2 and 3 (22 compared to 60) and would, therefore, result in fewer opportunities for the expression of social tension than under those alternatives, but more opportunities relative to the No-action Alternative or Alternative 4 (22 compared to 7). As under the other action alternatives, the degree of tension expressed by some hunt opponents might also be affected by the number of PCFG whales that could be killed. A maximum of one PCFG whale could be killed every other year under Alternative 5 (assuming all struck and lost whales are PCFG whales that subsequently die), although the actual number would likely be one whale ever 5 years (Table 4-1). Thus, while the potential for social tension regarding the killing of PCFG whales would be greater than under the No-action Alternative, the potential would be less than under any of the other action alternatives.

4.8.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Alternative 6 would likely result in the same number of days with hunt-related trips as Alternatives 2 and 3 and would, therefore, result in the same number of opportunities for the expression of social tension, and more opportunities relative to the No-action Alternative. The maximum number of PCFG whales that could be killed per year (on average) under Alternative 6 would be 3.5, although the actual number would likely be 1.4 (Table 4-1). These values are similar to the corresponding values for Alternative 3. With respect to the potential for social tension regarding the killing of PCFG whales, Alternative 6 would, therefore, be similar to Alternative 3, with a lower potential than under Alternative 2 and a greater potential than under the No-action Alternative or Alternative 5. The potential could also be greater than under Alternative 4, because of the likelihood of killing more PCFG whales. On the other hand, the deliberate hunting of known whales under Alternative 4 could result in greater potential for social tension than under Alternative 6.

Also, under Alternative 6, the waiver and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Social tension could increase under Alternative 6 if it creates a foreseeable point in time that compels people to elevate their expression of support or opposition to a tribal whale hunt as the 10-year period draws to a close.

4.9 Cultural Resources

This subsection addresses the potential for the alternatives to affect cultural resources in the project area, including historic sites, archaeological sites, and traditional cultural properties. The analysis considers the potential for whale hunting or related activities to affect physical sites with cultural significance. Ways in which hunt-related activities could affect cultural sites include physical damage from towing a whale to shore, or trampling of sensitive sites by persons observing or participating in a hunt or related activities. Potential effects on cultural practices and the cultural identity of the Makah Tribe are addressed in Subsection 4.10, Ceremonial and Subsistence Resources.

Two historic sites listed on the National Register of Historic Places occur in the waters or shoreline of the Makah U&A (Subsection 3.9.3.1, National Historical Register Sites). These are Tatoosh Island and the Wedding Rock Petroglyphs. In addition, Fort Núñez Gaona – Diah Veterans Park is located in Neah Bay (Subsection 3.9.3.3, Other Culturally Important Sites). Under the No-action Alternative, the potential for adverse effects on these sites would not differ from the potential under current conditions. There is a low risk of intentional or unintentional damage or disturbance by recreational users or other people in the areas where these sites occur.

It is improbable that any of these sites would be affected by activities directly related to harvesting a whale (such as towing the whale to shore, butchering, and transporting whale products from the landing site) under any of the action alternatives. Fort Núñez Gaona – Diah Veterans Park is located on Bayview Avenue in Neah Bay and would not be affected by towing a whale to shore or landing it at Front Beach, which is at the opposite side of the bay. At Tatoosh Island, logistical challenges related to the transport of people, equipment, and butchered whale products make it unlikely that any whales would be landed at that site. In addition, the Tatoosh Island lighthouse is geographically separate from the rocky shore. Moreover, the island is owned by the Tribe and was traditionally used for landing whales, so few (if any) non-tribal onlookers would be present at the landing site and landing a whale there would be in keeping with Makah cultural tradition. The beach where the Wedding Rock Petroglyphs occur is a remote, off-reservation location that lacks vehicle access, making it an unlikely site for landing whales.

The potential for listed historic sites to be damaged by hunt observers or onlookers is also low. The only site where this could occur is the Wedding Rock Petroglyphs, because access to Tatoosh Island is restricted by the Makah Tribe. Although it is unlikely that a whale would be landed at the beach where the Wedding Rock Petroglyphs are found, people could attempt to view from the access trail hunt activities on the water. It is possible that persons viewing a whale hunt might accidentally tread or encroach upon an existing archaeological or historic site. Because many activities associated with whale hunting would occur in marine locations not visible from the shoreline, the possibility of such accidental harm to this site is remote. Any damage to the Wedding Rocks Petroglyphs from shore-based visitors would likely be unrelated to any whale-hunting activities.

Unlisted sites, such as the shell midden sites along eroding beach terraces in the Olympic National Park, are also unlikely to be affected for the reasons described above. Makah whalers would be most likely to choose a beach on the reservation for landing a whale to facilitate access for butchering and celebrations. Moreover, any whale that is landed and butchered would be close to the water's edge and not as far upland as the midden sites.

Many unlisted sacred sites on the Makah Reservation were traditionally used by Makah whalers and their families to prepare for whale hunting. Some ceremonial use of these sites would likely occur under the No-action Alternative, but the use would not necessarily be related to whale hunting. Under the action alternatives, the cultural value of these sacred sites would be enhanced by their use for whale hunting-related ceremonies. As noted in Subsection 3.9.3.3, Other Culturally Important Sites, the only traditional cultural property identified for this analysis is First Beach. Under the No-action Alternative, this site would not be used for any practices directly related to whale hunting. Use of this site for butchering whales under the action alternatives would be consistent with its traditional use by the Makah.

4.10 Ceremonial and Subsistence Resources

4.10.1 Introduction

This subsection addresses the potential for the alternatives to affect the Makah Tribe's efforts to revive ceremonial and subsistence practices associated with hunting and using whales, which in turn affect Makah culture. The Makah Tribe has a long history of hunting whales (Subsection 3.10.3.4, Makah Historic Whaling), as well as culturally significant treaty language reserving the right to hunt whales. Despite a more than 70-year hiatus in hunting whales before the 1999 and 2000 hunts, the Makah have maintained a close cultural and ceremonial association to this traditional activity. Makah ceremonial and subsistence practices associated with whale hunting that are undertaken by some members include preparation for the hunt, the hunt itself, processing and distribution of the products, and consumption of products from the hunt (Subsection 3.10.3.5.1, Makah Whaling). Also important is the satisfaction many tribal members derive from harvesting, preparing, sharing, and eating traditional food; practicing traditional activities and applying and transmitting traditional knowledge; participating in ceremonial practices and spiritual connections associated with whales and whale hunting; and reinforcing cultural identity associated with the whale hunt and related activities (Subsection 3.10.3.5.1, Makah Whaling).

All of the alternatives have the potential to affect the Tribe's ceremonial and subsistence practices and Makah culture (Braund and Associates 2007). Persons whose ceremonial and subsistence practices could be affected by the alternatives include residents of the Makah Reservation, members of the Tribe who live elsewhere, and nearby treaty tribes. Makah tribal members who live off the reservation could be affected because strong kinship and cultural ties extend beyond the reservation's boundaries. Non-Makah tribes could be affected because of the close social and cultural ties among indigenous people (Subsection 3.8.3.2, Other Tribes).

Potential effects of the alternatives on archaeological resources associated with whale hunting are addressed in Subsection 4.9, Cultural Resources. Potential effects on the exercise of ceremonial and subsistence practices of indigenous people worldwide (by influencing the behavior of other countries toward indigenous people within their borders) are addressed in Subsection 4.17, Regulatory Environment Governing Harvest of Marine Mammals.

4.10.2 Evaluation Criteria

We used several criteria to determine the potential effects of the alternatives on the Tribe's ceremonial and subsistence practices related to whale hunting and the subsistence use of whales. They can be grouped into five categories: 1) access to whale hunting opportunities, 2) subsistence use, 3) traditional knowledge and activities, 4) spiritual connection to whale hunting, and 5) cultural identity. The following five subsections describe these categories in greater detail and identify how the effects of the alternatives may be assessed and differentiated.

4.10.2.1 Access to Whale Hunting Opportunities

Under the No-action Alternative, no whale hunt would be permitted. Whale hunting would be permitted under the action alternatives, with varying degrees and types of restrictions on the timing of hunts, the area in which hunts may occur, and the number of ENP and PCFG whales that may be killed and/or harvested. The following paragraphs provide information about the ways in which such restrictions on access to whale hunting opportunities could influence the ability of tribal members to engage in ceremonial and subsistence practices. Information is also provided about the Makah's perceptions and expectations regarding hunt timing, hunt location, and harvest limits. Additional information about the potential for hunting restrictions under the alternatives to limit opportunities for hunting and the number of whales harvested is provided in Subsection 4.1, Introduction.

Traditionally, whale hunting occurred year-round, whenever whales were present and there was a need for them (Braund and Associates 2007). Historically, the hunting season for gray whales began in March when they appeared in numbers off Tatoosh Island on their coastal migration north, and resumed in November during their migration south. Humpback and gray whales may have remained in the area all summer (Huelsbeck 1994), permitting whale hunting to occur from early spring through the fall (Subsection 3.10.3.4, Makah Historic Whaling). Makah tribal members have indicated a preference for hunting during the spring and fall whale migrations, as well as during the summer (Braund and Associates 2007). Several Makah indicated that the whales are fatter in the fall on their migration south. One individual also expressed a preference for hunting during the spring, observing that summer tourism and fall weather conditions could interfere with whale hunting during those times.

Historically, Makah hunted both on the ocean and on waters in the Strait of Juan de Fuca, depending on weather, wind, and the presence of whales. Any restrictions on location would contrast with traditional hunting, which occurred when and where the whales presented themselves, including in the Strait (Braund and Associates 2007). The Strait of Juan de Fuca provided hunting opportunities where conditions were safer because the weather is calm compared to the coastal portion of the Makah U&A, which can have 25-foot (7.6-m) waves (Braund and Associates 2007). Some Makah tribal members believe that excluding the Strait of Juan de Fuca from their hunting area would place whalers at increased risk, would prohibit them from whale hunting where their ancestors traditionally whaled, and would affect their ability to successfully take a whale (Braund and Associates 2007). No information is available about the distance from shore of historical hunting activities, although Braund and Associates (2007) identified areas close to shore as traditional hunting grounds and noted that shallow areas near rocks and islands are considered to be better locations for striking whales. It is reasonable to expect that tribal hunters traditionally sought opportunities as close to shore as possible, to minimize the risks associated with hunting on the open ocean as well as the distance over which a harvested whale would need to be towed.

Because the Makah have harvested only one whale in recent history (i.e., the 1999 harvest), there are few current whale harvest data upon which to assess the effect of the size of the harvest in terms of meeting Makah needs. However, as described in Subsection 3.10.3.5.2, Makah Subsistence Consumption, the Makah do rely on subsistence foods for a significant portion of their diet and emphasize marine resources. Furthermore, the 2001 tribal survey found that 81 percent of the respondents consumed whale products (blubber, meat, or oil) obtained from the 1999 hunt, and 87 percent would like to have these products available in the future (Renker 2002) (Subsection 3.10, Ceremonial and Subsistence Resources). According to Renker's 2011 household survey (Renker 2012), 80.6 percent of survey respondents wanted whale meat in their households on a regular basis, and 74.1 percent wanted whale oil on a regular basis.

Sepez (2001) calculated that the Makah households received an estimated 2.4 pounds (1.1 kg) of whale meat (0.55 lbs/0.25 kg) and blubber (1.8 lbs/0.82 kg) per capita from the 1999 whale hunt. Makah members have commented that one whale was not adequate to feed the entire community; it was not large enough to go around as a meaningful source of food (Braund and Associates 2007). According to Sepez's (2001) analysis (Subsection 3.10.3.5.1, Makah Whaling), the 1999 whale harvested by the Makah yielded approximately "2,000 to 3,000 pounds [907.2 to 1,360.8 kg] of meat and 4,000 to 5,000 pounds [1,814.4 to 2,268 kg] of blubber, most of which was consumed at the community potlatch." The Tribe's most recent needs statement (Renker 2012) estimates that harvesting an average of four gray whales per year would yield 8 to 20 pounds (4 to 9 kg) of meat per capita and 16 to 20 pounds (7 to 20 kg) of oil or blubber per capita (and a somewhat smaller amount of whale oil after rendering). Renker (2012) reported that Makah tribal members numbered 2,633 persons, with 1,121 of those living on the reservation, and that whale products would be shared with Makah living in and outside of Neah Bay.

This information indicates that there is a high demand for whale products and that one whale would not likely meet that need. It is uncertain how many whales would be needed to meet contemporary Makah needs. One indicator is the number of whales specified in the Makah Tribe's request to resume whale hunting—i.e., an average of four whales annually or approximately one whale per year per Makah village (Renker 2012). The harvest of four whales annually would be expected to provide a substantial opportunity to the Makah to hunt, process, and share whale products, and to prepare for and participate in ceremonial activities associated with whale hunting.

4.10.2.2 Subsistence Use

Subsistence use includes, among other things, harvesting, processing, sharing, and consuming foods. The ability to use a customary resource for subsistence depends on the availability of and access to that resource in traditional harvest locations. The resource must be available in sufficient numbers and of adequate health to allow a locally satisfactory harvest. A satisfactory harvest, in turn, would allow the subsistence community to participate in related activities. Access to resources can be affected by roads or trails that enhance access, by physical barriers (such as demonstrators who block access), by regulatory barriers, or by social barriers (such as an influx of recreational boaters into an area, displacing traditional users or resources). Traditional subsistence users of a resource may derive satisfaction from harvesting, processing, sharing, and consuming traditional foods. These activities reinforce traditional knowledge through use, exchange of knowledge, and training in traditional ways of performing subsistence activities (Subsection 3.10.3.5.2, Makah Subsistence Consumption). Under any of the alternatives, the extent to which the Tribe can engage in subsistence use of whales would depend on the opportunity to hunt and on the number of whales that could be harvested.

4.10.2.3 Traditional Knowledge and Activities

Surviving on locally available resources requires an intimate understanding of the environment based on a long-term relationship with the surrounding land, water, and resources. This knowledge comes from continued interaction with and observation of the surrounding environment and resources through subsistence activities, as well as through oral tradition passed down from elders to other community members and shared by active community residents. Individuals who carry and transfer this knowledge are generally those with a long history of participation in subsistence activities. The more a culturally important activity is practiced, the more likely it is that knowledge of that activity will pass from generation to generation. This valuable knowledge is not simply given away. Instead, community members who perform culturally important activities relay the knowledge, and younger participants earn the right to help as they learn from their elders. In some cases, only a limited number of people know specific skills (e.g., a harpooner) (Subsection 3.10.3.5.1, Makah Whaling).

If there is a hiatus in practicing the activity, the knowledge may be lost. It may take a long time, but eventually knowledge of specific elements of the activity wanes as elders die, especially if the cultural activities are not actively practiced. Maintaining traditional and cultural knowledge regarding whale hunting requires active participation in whale hunting (Subsection 3.10.3.4.1, Cessation of the Hunt).

Along with the knowledge of an activity, there are specific indigenous words (vocabulary) used to describe the activity, preparation for the activity, the hunting equipment, the weather and elements, the food, and ways to prepare the food, composing a seemingly endless and detailed list. Participation in the traditional activity results in more use of indigenous words and language to describe the activity; this, in turn, results in increased cultural awareness and more people and communities identifying themselves with their indigenous culture (cultural identity through shared language). In time, knowledge, activity, and transmission from generation to generation become part of an oral tradition (Subsection 3.10.3.5.1, Makah Whaling).

Under any of the alternatives, the number of traditional activities tribal members can practice and the number of times they can practice them, as well as the amount of traditional knowledge tribal members can apply and transmit, would depend on the number of opportunities to hunt and harvest whales and the number of whales available for the Tribe to use. The number of opportunities to hunt and the number of whales available would depend upon restrictions on the timing and area of the hunt, the mortality of PCFG whales, and the number of whales that could be harvested.

4.10.2.4 Spiritual Connection to Whale Hunting

Makah whale hunting rituals, spiritual and physical training, songs, dances, and ceremonial activities are well documented historically and in association with the 1999 and 2000 whale hunts (Subsection 3.10.3.4, Makah Historic Whaling, and Subsection 3.10.3.5.1, Makah Whaling). Whale hunts increase participation in ceremonial activities and rituals related to whale hunting. Similarly, the spiritual connection to whale hunting is strengthened as participants prepare for and conduct a whale hunt and then share the proceeds of the harvest. Makah whale hunting reinforces the relationship between the Makah and the whales. Makah tribal lore indicates that when the hunters and family prepare for the hunt and conduct it properly, perform the appropriate rituals, and live the culturally correct way, the whale gives itself to the Makah (Subsection 3.10.3.4, Makah Historic Whaling).

The amount of spiritual connection that tribal members have to whale hunting would depend primarily on the opportunity to hunt. The extent of that opportunity could also affect tribal members' spiritual connection to whale hunting. The extent of the opportunity to hunt would depend upon the extent to which hunting activities would be restricted by limits on the timing and area of the hunt, the mortality of PCFG whales, and the number of whales that could be harvested.

4.10.2.5 Cultural Identity

Under current conditions (the No-action Alternative), the cultural identity of Makah tribal members is expressed in a variety of ways, including fishing, singing, dancing, potlatching, making traditional handicraft articles, and using the Makah language. Subsection 3.10.3.5, Contemporary Makah Society, describes the various activities available to tribal members to experience and strengthen their cultural identity. The Makah tribal and cultural identity associated with whale hunting in particular is well documented (Subsection 3.10.3.5.3, Symbolic Expression of Whaling). Actively hunting whales enhances the community's connection to its whale hunting history and reinforces the sense of connection to the local marine environment and to ancestors who used the resource in the past. Other measures of cultural identity associated with whale hunting include the following:

- Use of the whale as a cultural symbol
- Pride in whale hunting traditions
- Traditional values of pride, self-esteem, responsibility, and identification with the past
- Local perceptions of community cultural identity with whale hunting
- Tribal identity

- A sense of the community cooperatively working together toward the common cultural goal of preparing to hunt, harvesting, processing, distributing, and eating the product of their communal labor
- A sense of autonomy

The potential for any of the alternatives to reinforce Makah cultural identity associated with whale hunting would depend primarily on the opportunity for tribal members to hunt. The extent to which that cultural identity may be reinforced would depend upon the extent to which hunting activities would be restricted by limits on the timing and area of the hunt, the mortality of PCFG whales, and the number of whales that could be harvested.

4.10.3 Evaluation of Alternatives

The following subsections compare the potential for the alternatives to affect Makah ceremonial and subsistence practices. For each alternative, the analysis considers its effect on ceremonial and subsistence practices, including subsistence uses, traditional knowledge and activities, spiritual connection to whale hunting, and cultural identity that would result from a decision by the federal government to permit or deny the Makah Tribe's request to hunt whales. For those alternatives that would allow hunting, the analysis also considers the effect of hunting regulations on the same set of ceremonial and subsistence practices.

The No-action Alternative carries the greatest risk of adverse effects on the Makah Tribe's ceremonial and subsistence practices associated with whale hunting. This is because under the No-action Alternative no whale hunting would be allowed, so these practices either could not occur or would be restricted. In contrast, Alternatives 2 through 6 would all allow the Makah to hunt whales, with variations in season, area, and harvest limits. Having an opportunity to hunt whales would enable the Tribe to engage more frequently in a greater range of ceremonial and subsistence practices, compared to the No-action Alternative. The amount of increase could be affected by regulations on hunting. Possible regulations include limits on the timing and area where a hunt would be allowed, and on the number of whales that could be struck, struck and lost, or harvested, including limits on PCFG whales. Alternative 2, with the least restrictive limits on hunting among the action alternatives, would have the greatest potential to benefit the Tribe's ceremonial and subsistence practices associated with hunting whales.

In the following discussions of Alternatives 2 through 6, the degree of change from the No-action Alternative and the comparison to other alternatives are included in the summary of effects subsection. Also, under Alternative 6, the waiver and implementing regulations would lapse after 10 years and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

4.10.3.1 Alternative 1, No Action

Under the No-action Alternative, no whale hunt would be permitted. Gray whales would continue to be available in that they are abundant in traditional harvest areas, but the Makah would not have access to hunt them. Tribal members could engage in some activities associated with whale hunting, such as performing ceremonies and rituals; building whale-hunting canoes; or processing, sharing, and consuming drift whales or whales incidentally caught in fisheries. However, very few such whales have actually been used in recent times; out of 21 entangled or stranded whales in the past 20 years, only two have been used by the Tribe[14] (Subsection 2.4.2, Subsistence Use of Drift Whales). Moreover, many of the activities the Tribe could continue to pursue have limited cultural value if they are not practiced in connection with actual whale hunts. Many other activities associated with the actual hunt would not be permitted and could not occur, such as approaching, striking, killing, and towing whales to shore.

Under the No-action Alternative, transfer of knowledge related to whale hunting would be limited to discussions of past whale hunting, and revitalized culture bearers who would participate in whale hunting would not be forthcoming. There would be no language and vocabulary growth related to whale-hunting activities, and the oral tradition of whale hunting would focus on historic activities and would not include ongoing participation in this culturally central activity.

Under the No-action Alternative, the opportunity for tribal members to experience a spiritual connection to whale hunting is limited to a connection with past whale hunting. Whale hunting songs and dances would likely remain within whale hunting families, but the 70-year hiatus would resume and there would be little reason or opportunity to perform and share them with the larger community. Without any whale hunting activity, the spiritual connection to whale hunting may eventually wane, and young Makah tribal members would lack any active whaler role models living what the Makah consider a culturally proper life that they could respect, admire, and emulate. The community connection to whale hunting would remain a connection to the past without any present reinforcement based on active participation in whale hunting activities.

[14] In 1994, the Northwest treaty Indian tribes advised NMFS of their intent to exercise their treaty rights to marine mammals (and this was done with the 1995 whale carcass used by Makah tribal members) (NMFS 1995). However, the Tribe's usual response is to assist the entangled animal, and Tribal biologists have participated in several recent disentanglement efforts, including two humpback whales in 2008 and 2010 (Cascadia Research Collective 2008; 2010a) and the successful disentanglements of gray whales in 2009 and 2013 (NMFS 2013a).

Although the amount of whale hunting activity and associated cultural use of whales would not differ from current levels, tribal identity could erode in the absence of opportunities to participate in an activity central to Makah cultural identity. The community would have little or no opportunity or incentive to work cooperatively to prepare for the hunt; to harvest, butcher, share, and eat whale; or to participate in song and dance festivals celebrating a successful harvest. Individual and community pride associated with conducting these activities would not occur, and self-esteem could decline among those Makah tribal members who believe the Tribe should continue to hunt whales.

In addition, because contemporary Makah cultural identity includes the 150-year-old treaty right to hunt whales, this alternative would continue to reinforce the sense that the Makah are not in control of their destiny, and it would undermine a sense of autonomy within the community. For Makah who believe strongly in their cultural heritage and treaty rights, this alternative would reinforce their feeling of disillusionment with the federal government.

4.10.3.2 Alternative 2, Tribe's Proposed Action

Whale hunts would be permitted under Alternative 2. An average of four whales could be harvested per year, with no more than five harvested in a single year and no more than seven whales struck per year. Hunting would be limited to the period from December 1 through May 31 in the coastal portion of the Makah U&A. The limit on the number of PCFG whales killed per year would be four, based on current population estimates (Table 4-3). Only PCFG whales harvested, not whales struck and lost, would be counted toward that limit. As a result, Alternative 2 would be expected to increase the Makah Tribe's opportunities to revive ceremonial and subsistence practices associated with hunting and using whales, compared to the No-action Alternative, but to a limited degree, as discussed below.

4.10.3.2.1 Access to Whale Hunting Opportunities

By allowing hunting only during the winter and spring months, when severe weather would be a frequent occurrence, Alternative 2 would likely limit the number of suitable hunting days to approximately 43 (Subsection 4.1.2.1, Potential Timing of a Hunt and Number of Hunting Days). This in turn could make it difficult to harvest the four whales annually allowed under Alternative 2. In addition, during 6 months of the year, tribal members would not have the latitude to hunt and harvest whales at opportune times, such as when whales are available, when weather conditions are favorable, or when hunters are prepared.

Restricting whale hunts to the portions of the U&A west of the Bonilla-Tatoosh line would keep the Makah from hunting whales in the Strait of Juan de Fuca. Prohibiting whale hunts in the Strait of Juan de Fuca would preclude access to a traditional hunting area as well as a large area in which hunting could potentially take place. This prohibition would also limit the flexibility of tribal members to hunt in the Strait of Juan de Fuca when weather conditions there are more favorable than in the coastal portion of the Makah U&A. In addition, prohibiting hunting in the Strait of Juan de Fuca would reduce opportunities to hunt a whale close to the community and to butchering sites. A greater distance between the site of a whale kill and the location of the landing beach would mean a greater distance over which the whale carcass would have to be towed, with a greater chance of the meat spoiling.

The Makah Tribe would be allowed to harvest an average of four whales annually, with no more than five whales harvested in any single year. The limit on the number of PCFG whales killed per year would be four, based on current population estimates (Table 4-3). In addition, only PCFG whales harvested, not whales struck and lost, would be counted toward that limit. It is, therefore, unlikely that limits on PCFG whale mortality would restrict the total number of whales that could be harvested per year under Alternative 2.

4.10.3.2.2 Subsistence Use

Under Alternative 2, the opportunity to resume hunting and harvesting whales would increase the Makah Tribe's ability to engage in a broad range of subsistence practices that are currently not possible or are severely limited. Under Alternative 2, the Makah could hunt for gray whales, a traditional marine resource, using many of their traditional methods. Based on the average number of days with favorable ocean conditions, combined with the probability of encountering gray whales, there would be a total of approximately 43 suitable hunting days during the 6-month hunting season, with an additional 17 days when ocean conditions may be suitable for other hunt-related activities (e.g., scouting) (Subsection 4.1.2.1, Potential Timing of a Hunt and Number of Hunting Days [Alternative 2, Tribe's Proposed Action]). The Tribe could harvest as many as four whales per year, and the Makah community could process, share, and consume this traditional food.

Under Alternative 2, the extent to which tribal members would be able to engage in subsistence use activities would thus increase from no opportunity to hunt whales (under the No-action Alternative) to an opportunity to hunt in the coastal portion of the Tribe's U&A on approximately 60 days from December 1 through May 31. The number of whales available for subsistence use would also increase by up to four harvested whales per year compared to the current potential use of perhaps one drift whale every 10 years[15] (i.e., drift whales or whales incidentally killed in fishing operations) under the No-action Alternative. Under Alternative 2, with its limited hunting season, it may be difficult for the Tribe to harvest the full limit of four whales on average per year. On the other hand, the initial portion

[15] This is likely an overestimate given that it is rare to find a drift whale that is suitable for human consumption and attempts are made (by the Tribe and others) to free entangled whales.

of the hunting season under Alternative 2 (i.e., December and January) would overlap with the whales' southward migration when, according to some tribal members, the whales are fatter and would thus provide more products for subsistence use than whales harvested during the late winter/spring northward migration or early in the summer feeding period (which begins around June 1).

The amount of satisfaction tribal members would derive from this increased subsistence use of whales would also likely increase compared to the No-action Alternative. The Tribe's needs statement indicated that 67.1 percent of surveyed households would like whale oil on a regular basis, 71.7 percent would like whale meat on a regular basis, and 47.4 percent would like whale blubber on a regular basis (Renker 2007).

4.10.3.2.3 Traditional Knowledge and Activities

As described above, under the No-action Alternative tribal members may engage in some, but not all, of the traditional activities associated with subsistence use of whales. The ability to actively hunt whales, which is prohibited under the No-action Alternative, would be allowed under Alternative 2, increasing the number of traditional activities that tribal members could practice. Specifically, tribal members could search for and find whales, and strike, harvest, and tow whales to shore. The number of times tribal members could participate in searching for and finding whales would increase compared to the No-action Alternative by approximately 60 days per year, from December 1 through May 31. The number of times they could participate in striking, harvesting, and towing whales to shore would increase by up to seven whales struck per year and four whales harvested per year on average. The increase in the number of times these activities are performed would also increase the amount of traditional knowledge associated with the activities, and the opportunities to apply and transmit that knowledge.

In addition to permitting some currently prohibited activities, thereby increasing the number of traditional activities that could be practiced, implementation of Alternative 2 could increase the number of times tribal members engage in activities that are not currently prohibited. Specifically, tribal members are not currently prevented from building large whale-hunting canoes or fabricating and maintaining whale-hunting equipment, but there is little practical reason for them to do so. If a whale hunt were authorized under Alternative 2, there would likely be an increase in the number of times that tribal members practice these activities.

Similarly, tribal members are not currently prohibited from processing and consuming whale products from drift whales, but the opportunity to do so is limited. The number of times tribal members could participate in processing whales would increase from the current potential of perhaps one drift whale every 10 years to four whales per year. The amount of whale products tribal members could share and consume would similarly increase from one drift whale every 10 years to four whales per year, although limits on hunt timing might make it difficult for tribal members to harvest the full limit.

Under Alternative 2, tribal members would again actively practice the skills necessary to build large whale-hunting canoes; fabricate and maintain whale-hunting equipment; search for and find whales; strike, harvest, and tow whales to shore; butcher and distribute whales; and perform ceremonial songs and dances to celebrate successful hunts. As a result, words and vocabulary related to preparing to hunt, hunting, harvesting, towing, and processing whales, as well as sharing, preparing, and consuming whale products, could become more widely used than they currently are (Braund and Associates 2007). Makah cultural awareness, both inside and outside of the Tribe, would become more pronounced, and the whale-hunting component of the Makah oral tradition would grow.

In contrast to the No-action Alternative, Alternative 2 would enable new generations to participate in whale hunting activities; develop, apply, and transmit knowledge of whale hunting; and learn and use words related to whale hunting. Makah youth would have active whalers as role models. With a resumption of whale hunting under Alternative 2, the amount of satisfaction tribal members might derive from the practice of traditional activities and the application of traditional knowledge would increase beyond that of the No-action Alternative.

4.10.3.2.4 <u>Spiritual Connection to Whale Hunting</u>

Under Alternative 2, the ability to resume whale hunting could increase the Makah's spiritual connection to whale hunting over the No-action Alternative, as whale-hunting activity could resume and recur year after year. This is because the connection would be current and ongoing, rather than a connection to a past activity that can no longer be pursued (Braund and Associates 2007).

4.10.3.2.5 <u>Cultural Identity</u>

As described above and in Subsection 3.10.3.5, Contemporary Makah Society, Makah tribal members currently have a variety of ways to express and reinforce their cultural identity. Also, as described above and in Subsections 3.10.3.4, Makah Historic Whaling, and 3.10.3.5.3, Symbolic Expression of Whaling, whale hunting was a culturally central activity in historic Makah society and the Tribe's whale-hunting past remains culturally important. Under Alternative 2, Makah whale-hunting rituals, spiritual training, songs, dances, and ceremonial activities would likely increase compared to the No-action Alternative and would regularly recur, thus reinforcing Makah cultural identity. The opportunity under Alternative 2 to regularly harvest, process, share, and consume whale products could lead to increased communal activities and an increase in tribal members' sense of community. The whale-hunting ceremonies that whalers and family members would follow for the hunt could provide the

Makah with an additional social framework, which could contribute to social and spiritual community stability.

4.10.3.3 Alternative 3, Offshore Hunt

Under Alternative 3, as under Alternative 2, whale hunts would be permitted. Alternative 3 would include the same hunting season and the same limits on the number of whales harvested as Alternative 2, but would prohibit Makah hunters from making an initial strike on a gray whale within 5 miles (8 km) of shore and would impose additional restrictions on the mortality of PCFG whales.

The number of whales that could be harvested under Alternative 3 would be the same as under Alternative 2 (an average of four per year, with no more than five in any one year). In contrast to Alternative 2, however, whales struck and lost would be counted toward the annual mortality limit for PCFG whales, potentially reducing the total number of whales that could be harvested in some years. Under some scenarios, it is possible that hunting activities for a given year could be curtailed before any whales are successfully harvested (Subsection 4.1.3, Alternative 3). Compared to Alternative 2, therefore, it is less likely that the Tribe would be able to harvest an average of four whales per year under Alternative 3.

4.10.3.3.1 Access to Whale Hunting Opportunities

Hunt timing would be the same under Alternative 3 as under Alternative 2, resulting in the same practical effects and tribal perceptions and expectations.

As under Alternative 2, hunting would not be allowed in the portion of the Makah U&A that extends into the Strait of Juan de Fuca, resulting in similar constraints on opportunities to hunt in traditional areas close to the community and to butchering sites. The additional restriction under Alternative 3 on hunting within 5 miles (8 km) of shore would further restrict tribal members' ability to hunt whales. Areas close to shore are traditional hunting grounds, and shallow areas near rocks and islands are considered to be better locations for striking whales (Braund and Associates 2007). Whale hunts that take place more than 5 miles (8 km) off shore would have a greater potential to encounter rough seas, compared to hunts closer to shore (i.e., under the other action alternatives), and expose tribal hunters to greater hazards. In addition, prohibiting hunting within 5 miles (8 km) of shore would further reduce opportunities to kill a whale close to the community and to butchering sites. A greater distance between the site of a whale kill and the location of the landing beach would mean a greater distance over which the whale carcass would have to be towed, with a greater chance of the meat spoiling.

Although Alternative 3 would have the same limits as Alternative 2 on the number of whales that could be harvested, whales struck and lost would be counted toward the annual mortality limit for PCFG whales, potentially reducing the total number of whales that could be harvested in some years. Under some scenarios, it is possible that hunting activities for a given year could be curtailed before any whales are successfully harvested (Subsection 4.1.3, Alternative 3). Compared to Alternative 2, therefore, it is less likely that the Tribe would be able to harvest an average of four whales per year under Alternative 3.

4.10.3.3.2 Subsistence Use

Under Alternative 3, as under Alternative 2, the opportunity to resume hunting and harvesting whales would increase the Makah Tribe's ability to engage in a broad range of subsistence practices that are currently not possible or are severely limited. Under Alternative 3, the Makah could hunt for gray whales, a traditional marine resource, using many of their traditional methods. Based on the average number of days with favorable ocean conditions, combined with the expectation that scouting expeditions would also be prepared to hunt if whales were found, it is assumed for this analysis that hunting could occur on approximately 60 days each year (Subsection 4.1.3.1, Potential Timing of a Hunt and Number of Hunting Days [Alternative 3, Offshore Hunt]). The Tribe could harvest as many as four whales per year, and the Makah community could process, share, and consume this traditional food.

Under Alternative 3, the extent to which tribal members would be able to engage in subsistence use activities would thus increase from no opportunity to hunt whales (under the No-action Alternative) to an opportunity to hunt in the coastal portion of the Tribe's U&A (greater than 5 miles [8 km] off shore) on approximately 60 days from December 1 through May 31. The number of whales available for subsistence use would also increase by as many as four harvested whales per year compared to the current potential use of perhaps one drift whale every 10 years under the No-action Alternative. The amount of satisfaction tribal members would derive from the increased subsistence use of whales would also likely increase compared to the No-action Alternative.

As under Alternative 2, the requirement to hunt only during the winter and spring months could reduce the likelihood of harvesting the full limit of four whales on average per year. The likelihood of attaining the harvest limit would be further reduced by the prohibition on hunting activities within 5 miles (8 km) of shore and by the restrictions on mortality of PCFG whales. As under Alternative 2, whales harvested during their southward migration may be fatter, thus providing more products for subsistence use than whales harvested at other times of year.

Compared to Alternative 2, the Tribe's subsistence use of whales would be less under Alternative 3 because no hunting would be allowed within 5 miles (8 km) of shore and because restrictions on the mortality of PCFG whales could result in the curtailment of hunting activities in some years, possibly even before any whales are harvested.

4.10.3.3.3 Traditional Knowledge and Activities

Under Alternative 3, the increase compared to the No-action Alternative in some aspects of traditional knowledge and activities would likely be the same as under Alternative 2 because the restrictions on the hunt area, season, and methods would the same under the two alternatives, with the exception that Makah hunters would be prohibited from making an initial strike on a gray whale within 5 miles (8 km) of shore. This restriction would likely mean that the Tribe would conduct a motorized hunt and not use canoes; however, it would not be expected to result in a different number of days with hunt-related activities than under Alternative 2. Therefore, compared to the No-action Alternative, the increase in traditional knowledge and activities associated with searching for and finding whales under Alternative 3 would likely be similar to Alternative 2.

The number of times tribal members could participate in striking, harvesting, and towing whales to shore would increase by up to six whales struck per year (compared to seven whales per year under Alternative 2) and four whales harvested per year on average. The increase in the number of times these activities are performed would also increase the amount of traditional knowledge associated with the activities, and the opportunities to apply and transmit that knowledge.

Under Alternative 3, as under Alternative 2, the number of times tribal members could participate in activities associated with harvesting and processing whales would increase from the current potential of perhaps one drift whale every 10 years to as many as four whales per year, on average. The amount of whale products tribal members could share and consume would similarly increase from one drift whale every 10 years to four whales per year, although limits on hunt location and on the mortality of PCFG whales might make it difficult for tribal members to harvest the full limit. Under Alternative 3, other aspects of traditional knowledge and activities would likely increase over current conditions to the same extent as under Alternative 2.

Similar to Alternative 2, Alternative 3 would afford tribal members more opportunities, compared to the No-action Alternative, to engage in traditional activities that are currently prohibited, as well as activities that are not currently prohibited. Although it is likely that the Tribe would choose to conduct motorized hunts under Alternative 3, canoe-based hunts would still be possible. Therefore, under Alternative 3, tribal members could again actively practice the skills necessary to build large whale-hunting canoes; fabricate and maintain whale-hunting equipment; search for and find whales; strike, harvest, and tow whales to shore; butcher and distribute whales; and perform ceremonial songs and dances to celebrate successful hunts. As a result, words and vocabulary related to preparing to hunt, hunting, harvesting, towing, and processing whales, as well as sharing, preparing, and consuming whale products, would likely become more widely used than they currently are.

In contrast to the No-action Alternative, Alternative 3 would enable new generations to participate in whale hunting activities; develop, apply, and transmit knowledge of whale hunting; and learn and use words related to whale hunting. Makah youth would have active whalers as role models. With a resumption of whale hunting under Alternative 3, the amount of satisfaction tribal members might derive from the practice of traditional activities and the application of traditional knowledge would increase beyond the current level.

Compared to Alternative 2, the Makah Tribe would be able to practice the same number of activities and apply and transmit the same types of traditional knowledge. However, the number of times they could practice both currently allowed and currently prohibited activities, and could apply traditional knowledge, would be less under Alternative 3 than under Alternative 2 because Alternative 3 would be expected to result in a lower chance that the Tribe would be able to harvest four whales per year.

4.10.3.3.4 Spiritual Connection to Whaling

Under Alternative 3, the ability to resume whale hunting would likely increase the Makah's spiritual connection to whale hunting compared to the No-action Alternative, as described under Alternative 2.

4.10.3.3.5 Cultural Identity

Under Alternative 3, the ability to resume whale hunting would likely increase the cultural identity of the Makah compared to the No-action Alternative, as described under Alternative 2.

4.10.3.4 Alternative 4, Summer/Fall Hunt

Under Alternative 4, as under Alternatives 2 and 3, whale hunts would be permitted. Under Alternative 4, whale hunting would be permitted in the same portion of the Makah U&A as under Alternative 2, but the hunting season would extend from June 1 through November 30 instead of December through May. In addition, the maximum number of whales harvested would be limited to one ENP male whale per year. It is possible that no whales could be harvested in some years if tribal hunters are unable to locate and strike a known ENP male or if a whale is struck and lost (in which case the hunt would be ended for the year).

4.10.3.4.1 Access to Whale Hunting Opportunities

Hunting during summer under Alternative 4 would enable Makah tribal members to hunt during months with the lowest risk of encountering adverse weather conditions or rough seas that would interfere with hunting opportunities and compromise hunter safety. In addition, hunting would target PCFG whales that are feeding in the project area. Actively feeding whales tend to be found in relatively shallow waters close to shore and remain in the area for extended periods (Subsection 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements), potentially making them more accessible and vulnerable to a strike. Compared to Alternative 2, therefore, Alternative 4 would give tribal hunters greater latitude to hunt and harvest whales at opportune times, based on sea and weather conditions, presence and availability of whales, subsistence need, and preparedness of hunters. The area in which whale hunting would be allowed under Alternative 4 would be the same as under Alternative 2 (i.e., the coastal portion of the Makah U&A, excluding the Strait of Juan de Fuca) and would be expected to result in the same practical effects and tribal perceptions and expectations.

The maximum number of whales that could be harvested under Alternative 4 would be limited to one per year under current conditions. It is possible, however, that no whales could be harvested in some years if tribal hunters are unable to locate and strike a known ENP male or if a whale is struck and lost (in which case the hunt would be ended for the year). This would mean that the number of whales harvested under Alternative 4 would be 0 percent to 25 percent of the number of whales (four) specified in the Makah Tribe's request to resume whale hunting. The harvest of zero to one whale per year would thus be expected to provide opportunities for Makah tribal members to engage in ceremonial and subsistence practices that would not be available under the No-action Alternative, but to a lesser degree than under Alternatives 2 and 3.

4.10.3.4.2 <u>Subsistence Use</u>

Under Alternative 4, the opportunity to resume hunting and harvesting whales would increase the Makah Tribe's ability to engage in a broad range of subsistence practices that are currently not possible or are severely limited. Under Alternative 4, the Makah could hunt for gray whales, a traditional marine resource, using many of their traditional methods. Based on the expectation that locating and striking a known ENP male would take no more than 7 days, it is assumed for this analysis that hunting could occur on approximately 7 days each year (Subsection 4.1.4.1, Potential Timing of a Hunt and Number of Hunting Days [Alternative 4, Summer/Fall Hunt]). The Tribe could harvest up to one whale per year under current conditions, and the Makah community could process, share, and consume this traditional food.

Under Alternative 4, the extent to which tribal members would be able to engage in subsistence use activities would thus increase from no opportunity to hunt whales under current conditions (the No-action Alternative), to an opportunity to hunt in the coastal portion of the Tribe's U&A on approximately 7 days from June through November (Subsection 4.1.4.1, Potential Timing of a Hunt and Number of Hunting Days). The number of whales available for subsistence use would also increase by zero to one harvested whale per year compared to the current potential use of perhaps one drift whale every 10 years under the No-action Alternative. Although this would be an increase over current conditions, the number of whales harvested under Alternative 4 would be 0 percent to 25 percent of the number of whales (four) specified in the Makah Tribe's request to resume whale hunting. Based on the high percentage of Makah residents desiring whale products for consumption and use, limiting the number of whales harvested to one would likely not meet the Makah's need for whale products (Braund and Associates 2007).

The amount of satisfaction tribal members would derive from the increased subsistence use of whales would also likely increase compared to the No-action Alternative. As indicated above, however, an increase of one whale per year would not likely be perceived by tribal members as adequate to meet the Tribe's needs. The Tribe's needs statement indicated that four whales per year would likely be sufficient to meet demand for whale oil, whale meat, and whale blubber (Renker 2007).

Compared to Alternatives 2 and 3, the Tribe's subsistence use of whales would be less under Alternative 4 because under the No-action Alternative no more than one whale could be harvested per year (compared to four on average under Alternatives 2 and 3) and because restrictions on the mortality of PCFG whales could result in the curtailment of hunting activities in some years, possibly even before any whales are harvested.

4.10.3.4.3 Traditional Knowledge and Activities

Under Alternative 4, the number of times tribal members could participate in searching for and finding whales would increase compared to the No-action Alternative on approximately 7 days per year with hunt-related activities. The number of times tribal members could participate in striking, harvesting, and towing whales to shore would also increase, with up to one whale struck and harvested per year under current conditions (refer to Table 4-7). The increase in the number of times these activities are performed would increase the amount of traditional knowledge associated with the activities, and the opportunities to apply and transmit that knowledge.

Under Alternative 4, the number of times tribal members could participate in processing whales would increase from the current potential of perhaps one drift whale every 10 years to as many as one whale per year. The amount of whale products tribal members could share and consume would similarly increase from one whale every 10 years to one whale per year, although limits on the mortality of PCFG whales could reduce that to zero whales in some years. Under Alternative 4, other aspects of traditional knowledge and activities would likely increase, compared to the No-action Alternative, to the same extent as under Alternative 2.

Similar to Alternatives 2 and 3, Alternative 4 would afford tribal members more opportunities, compared to the No-action Alternative, to engage in traditional activities that are currently prohibited, as well as activities that are not currently prohibited. Under Alternative 4, tribal members would again actively practice the skills necessary to build large whale-hunting canoes; fabricate and maintain whale-hunting equipment; search for and find whales; strike, harvest, and tow whales to shore; butcher and distribute whales; and perform ceremonial songs and dances to celebrate successful hunts. As a result, words and vocabulary related to preparing to hunt, hunting, harvesting, towing, and processing whales, as well as sharing, preparing, and consuming whale products, would likely become more widely used than they currently are.

In contrast to the No-action Alternative, Alternative 4 would enable new generations to participate in whale hunting activities; develop, apply, and transmit knowledge of whale hunting; and learn and use words related to whale hunting. Makah youth would have active whalers as role models. With a resumption of whale hunting under Alternative 4, the amount of satisfaction tribal members might derive from the practice of traditional activities and the application of traditional knowledge would increase beyond the current level.

As under Alternatives 2 and 3, the Makah Tribe would be able to practice the same number of activities and apply and transmit the same types of traditional knowledge. However, the number of times they could practice both currently allowed and currently prohibited activities, and could apply traditional knowledge, would be less under Alternative 4 than under Alternatives 2 and 3.

4.10.3.4.4 Spiritual Connection to Whaling

Under Alternative 4, the ability to resume whale hunting would likely increase the Makah's spiritual connection to whale hunting compared to the No-action Alternative, as described under Alternative 2.

4.10.3.4.5 Cultural Identity

Under Alternative 4, the ability to resume whale hunting would likely increase the cultural identity of the Makah compared to the No-action Alternative, as described under Alternative 2.

4.10.3.5 Alternative 5, Split-season Hunt

Under Alternative 5, as under Alternatives 2, 3, and 4, whale hunts would be permitted. Under Alternative 5, whale hunting would be permitted in the same portion of the Makah U&A as under Alternatives 2 and 4, but the hunting season would be limited to 3 weeks in December and 3 weeks in May, in contrast to the 6-month-long hunting seasons under Alternatives 2 and 3. During years in which no whales are struck and lost, and no PCFG whales are killed, the maximum limit for the number of whales harvested would be four on average (and no more than five in a single year), the same as under

Alternatives 2 and 3. However, the landing of a single PCFG whale, or the striking and losing of a single whale, would end the hunt for any given year. Based on the constraints imposed by the hunting season and the PCFG mortality limit, it is expected that the Tribe would harvest up to one whale per year (Subsection 4.1.5, Alternative 5).

4.10.3.5.1 Access to Whale Hunting Opportunities

The hunting season under Alternative 5 would occur during 3 weeks in December and 3 weeks in May as compared to Alternatives 2 and 3 (i.e., occurring December through May), resulting in the same practical effects and tribal perceptions and expectations. The difficulties associated with not having the latitude to hunt and harvest whales at opportune times would be compounded by the additional limitation on the number of days when hunting would be allowed. By limiting the hunting season to two 3-week periods in December and May, Alternative 5 would reduce the number of potential hunting days to approximately 11 days in May (most likely timing of hunt), compared to 33 days and 43 days under Alternatives 2 and 3, respectively. Compared to Alternatives 2 and 3, therefore, tribal members would have fewer opportunities to hunt, reducing the likelihood of harvesting the four whales annually allowed under Alternative 5.

The hunting area under Alternative 5 would be the coastal portion of the Makah U&A, as under Alternatives 2 and 4, and would be expected to result in the same practical effects and tribal perceptions and expectations.

Although the maximum number of whales that could be harvested under Alternative 5 would be four, it is expected that the Tribe would actually harvest no more than one whale every year. This would mean that the number of whales harvested annually under Alternative 5 would be approximately 25 percent of the number of whales (four) specified in the Makah Tribe's request to resume whale hunting. The harvest of zero to one whale per year would thus be expected to provide opportunities for Makah tribal members to engage in ceremonial and subsistence practices that would not be available under the No-action Alternative, but to a lesser degree than under Alternatives 2 and 3.

4.10.3.5.2 Subsistence Use

Under Alternative 5, the opportunity to resume hunting and harvesting whales would increase the Makah Tribe's ability to engage in a broad range of subsistence practices that are currently not possible or are severely limited. Under Alternative 5, the Makah could hunt for gray whales, a traditional marine resource, using many of their traditional methods. Based on the average number of days with favorable ocean conditions, combined with the probability of encountering gray whales, there would be a total of approximately 15 suitable hunting days (11 of those days in May) during the split hunting season, with an additional 7 days when ocean conditions may be suitable for other hunt-related activities (e.g., scouting in either May or December) (Subsection 4.1.5.1, Potential Timing of a Hunt and Number of Hunting Days [Alternative 5, Split-season Hunt]). The Tribe could harvest as many as four whales per year (although the actual number would likely be between zero and one), and the Makah community could process, share, and consume this traditional food.

Under Alternative 5, the extent to which tribal members would be able to engage in subsistence use activities would thus increase from no opportunity to hunt (under the No-action Alternative) to an opportunity to engage in hunting or hunt-related activities in the coastal portion of the Tribe's U&A on approximately 17 days in May and 5 days in December. The number of whales available for subsistence use would also increase by as many as four whales per year compared to the potential use of perhaps one drift whale every 10 years under the No-action Alternative.

The amount of satisfaction tribal members would derive from the increased subsistence use of whales would also likely increase compared to the No-action Alternative. As indicated above, however, an increase of zero to one whale per year would not likely be perceived by tribal members as adequate to meet the Tribe's needs. The Tribe's needs statement indicated that four whales per year would likely be sufficient to meet demand for whale oil, whale meat, and whale blubber (Renker 2007).

Compared to Alternatives 2 and 3, the Tribe's subsistence use of whales would likely be less under Alternative 5 because the number of whales harvested per year would probably be between zero and one, compared to four on average under Alternatives 2 and 3. Compared to Alternative 4, the Tribe's potential subsistence use of whales could be greater under Alternative 5 because the maximum number of whales harvested per year would be four, compared to one under current conditions under Alternative 4 (refer to Table 4-7). Whether the actual subsistence use would be greater would depend on the Tribe's ability to locate and harvest non-PCFG whales.

4.10.3.5.3 Traditional Knowledge and Activities

Under Alternative 5, the number of times tribal members could participate in searching for and finding whales would increase compared to the No-action Alternative by approximately 22 days per year (17 days in May and 5 days in December). The number of times tribal members could participate in striking, harvesting, and towing whales to shore would increase by up to five whales struck and four whales harvested per year, although the actual number harvested would likely be between zero and one whale per year on average. The increase in the number of times these activities are performed would also increase the amount of traditional knowledge associated with the activities, and the opportunities to apply and transmit that knowledge.

The number of times tribal members could participate in processing whales would increase from the current potential of perhaps one drift whale every 10 years (under the No-action Alternative) to zero to one whale (and possibly as many as four whales) per year. The amount of whale products tribal members could share and consume would similarly increase from one whale every 10 years to as many as four whales per year, although that number would more likely be between zero and one because of limits on hunt timing and the mortality of PCFG whales.

Similar to Alternatives 2, 3, and 4, Alternative 5 would afford tribal members more opportunities, compared to the No-action Alternative, to engage in traditional activities that are currently prohibited, as well as activities that are not currently prohibited. Under Alternative 5, tribal members would again actively practice the skills necessary to build large whale-hunting canoes; fabricate and maintain whale hunting equipment; search for and find whales; strike, harvest, and tow whales to shore; butcher and distribute whales; and perform ceremonial songs and dances to celebrate successful hunts. As a result, words and vocabulary related to preparing to hunt, hunting, harvesting, towing, and processing whales, as well as sharing, preparing, and consuming whale products, would likely become more widely used than they currently are.

In contrast to the No-action Alternative, Alternative 5 would enable new generations to participate in whale hunting activities; develop, apply, and transmit knowledge of whale hunting; and learn and use words related to whale hunting. Makah youth would have active whalers as role models. With a resumption of whale hunting under Alternative 5, the amount of satisfaction tribal members might derive from the practice of traditional activities and the application of traditional knowledge would increase beyond the current level.

As under Alternatives 2, 3, and 4, the Makah Tribe would be able to practice the same number of activities and apply and transmit the same types of traditional knowledge. The number of times they could practice both currently allowed and currently prohibited activities, and could apply traditional knowledge, would be less under Alternative 5 than under Alternatives 2 and 3. Based on the anticipated number of days with hunt-related trips, the number of times tribal members could practice both currently allowed and currently prohibited activities, and could apply traditional knowledge, would likely be greater under Alternative 5 than under Alternative 4.

4.10.3.5.4 Spiritual Connection to Whale Hunting

Under Alternative 5, the ability to resume whale hunting would likely increase the Makah's spiritual connection to whale hunting compared to the No-action Alternative, as described under Alternative 2.

4.10.3.5.5 Cultural Identity

Under Alternative 5, the ability to resume whale hunting would likely increase the cultural identity of the Makah compared to the No-action Alternative, as described under Alternative 2.

4.10.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Under Alternative 6, as under Alternatives 2, 3, 4, and 5, whale hunts would be permitted. Alternative 6 would have the same conditions as Alternative 2 regarding the hunt area, season, and methods. Alternative 6 would include greater restrictions than Alternatives 2 and 3 on the maximum number of whales that could be killed per year and per 2 years, resulting in a maximum of 3.5 whales harvested per year on average. Also, under Alternative 6, the waiver and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

4.10.3.6.1 Access to Whale Hunting Opportunities

Because hunt timing (December through May) and the area in which hunting would be allowed (the coastal portion of the Makah U&A, excluding the Strait of Juan de Fuca) under Alternative 6 would be the same as under Alternative 2, the two alternatives would be expected to result in the same practical effects and tribal perceptions and expectations.

Under Alternative 6, the maximum number of whales that could be killed per year by the Tribe would be determined by the total limit on strikes, which would be not more than four in a single year and seven over 2 years, equating to 3.5 whales per year on average. The average number of whales harvested annually under Alternative 6 would be approximately 88 percent of the number of whales (four) specified in the Makah Tribe's request to resume whale hunting. The harvest of 3.5 whales per year on average would thus be expected to provide opportunities for Makah tribal members to engage in ceremonial and subsistence practices that would not be available under the No-action Alternative, but to a lesser degree than under Alternatives 2 and 3.

4.10.3.6.2 Subsistence Use

Under Alternative 6, the opportunity to resume hunting and harvesting whales would increase the Makah Tribe's ability to engage in a broad range of subsistence practices that are currently not possible or are severely limited. The Makah could hunt for gray whales, a traditional marine resource, using many of their traditional methods. Because Alternative 6 would include the same conditions as Alternative 2 regarding the hunt area, season, and methods, the two alternatives would be expected to result in the same number of days with opportunities for whale hunting and related activities. Under

Alternative 6, the extent to which tribal members would be able to engage in subsistence use activities would thus increase from no opportunity to hunt whales (under the No-action Alternative) to an opportunity to hunt in the coastal portion of the Tribe's U&A on approximately 60 days from December 1 through May 31. Alternative 6 would impose an additional burden on the Makah Tribe's ceremonial and subsistence use of gray whales as it would require the Tribe to submit a new request for waiver and invest resources in the pursuit of a waiver if the Tribe desired to continue hunting gray whales after the initial 10-year waiver and regulations lapse.

The number of whales available for subsistence use under Alternative 6 would increase by 3.5 harvested whales per year on average, compared to the potential use of perhaps one whale every 10 years (i.e., drift whales or whales incidentally caught in fishing operations) under the No-action Alternative. As under Alternative 2, limitations on the hunting season could impede the Tribe's ability to harvest the full limit each year, although the ability to hunt during much of the period of the whales' southward migration could result in the harvest of whales that provide relatively large amounts of products for subsistence use.

The amount of satisfaction tribal members would derive from the increased subsistence use of whales would also likely increase compared to the No-action Alternative. An increase of 3.5 whales on average per year would be slightly less than the amount that might be considered sufficient to meet demand for whale oil, whale meat, and whale blubber (i.e., four whales per year) (Renker 2007).

Compared to Alternatives 2 and 3, the Tribe's subsistence use of whales would likely be less under Alternative 6 because the average number of whales harvested per year would be approximately 3.5, compared to four under Alternatives 2 and 3. Compared to Alternatives 4 and 5, the Tribe's subsistence use of whales could be greater under Alternative 6 because the number of whales harvested per year would be greater than the number (zero to one) anticipated under those two alternatives.

4.10.3.6.3 Traditional Knowledge and Activities

Under Alternative 6, as under Alternative 2, the number of times tribal members could participate in searching for and finding whales would increase compared to the No-action Alternative by approximately 60 days per year. The number of times tribal members could participate in striking, harvesting, and towing whales to shore would increase by up to 3.5 whales struck and 3.5 whales harvested per year, on average. The increase in the number of times these activities are performed would also increase the amount of traditional knowledge associated with the activities, and the opportunities to apply and transmit that knowledge.

The number of times tribal members could participate in processing whales would increase from the current potential of perhaps one drift whale every 10 years to 3.5 whales per year on average. The amount of whale products tribal members could share and consume would similarly increase from one whale every 10 years to 3.5 whales per year, although limits on hunt timing might make it difficult for tribal members to harvest the full limit.

Similar to Alternatives 2, 3, 4, and 5, Alternative 6 would afford tribal members more opportunities, compared to the No-action Alternative, to engage in traditional activities that are currently prohibited, as well as activities that are not currently prohibited. Under Alternative 6, tribal members would again actively practice the skills necessary to build large whale-hunting canoes; fabricate and maintain whale hunting equipment; search for and find whales; strike, harvest, and tow whales to shore; butcher and distribute whales; and perform ceremonial songs and dances to celebrate successful hunts. As a result, words and vocabulary related to preparing to hunt, hunting, harvesting, towing, and processing whales, as well as sharing, preparing, and consuming whale products, would likely become more widely used than they currently are.

In contrast to the No-action Alternative, Alternative 6 would enable new generations to participate in whale hunting activities; develop, apply, and transmit knowledge of whale hunting; and learn and use words related to whale hunting. Makah youth would have active whalers as role models. With a resumption of whale hunting under Alternative 6, the amount of satisfaction tribal members might derive from the practice of traditional activities and the application of traditional knowledge, would increase beyond the current level.

As under Alternatives 2, 3, 4, and 5, the Makah Tribe would be able to practice the same number of activities and apply and transmit the same types of traditional knowledge. The number of times they could practice both currently allowed and currently prohibited activities, and could apply traditional knowledge, would be slightly less under Alternative 6 than under Alternatives 2 and 3. Based on the anticipated number of days with hunt-related trips, the number of times tribal members could practice both currently allowed and currently prohibited activities, and could apply traditional knowledge, would likely be greater under Alternative 6 than under Alternatives 4 and 5.

4.10.3.6.4 Spiritual Connection to Whale Hunting

Under Alternative 6, the ability to resume whale hunting would likely increase the Makah's spiritual connection to whale hunting compared to the No-action Alternative, as described under Alternative 2.

4.10.3.6.5 Cultural Identity

Under Alternative 6, the ability to resume whale hunting would likely increase the cultural identity of the Makah compared to the No-action Alternative, as described under Alternative 2.

4.11 Noise

4.11.1 Introduction

This subsection addresses the potential for the alternatives to affect sensitive noise receptors in the project area, specifically receptors in the human environment. Of particular concern is the potential for noise from hunt-related activities (including vessels, aircraft, or firearms) to disturb residents, businesses, and visitors in the project area. Residential and commercial areas that could potentially be affected by noise from hunt-related activities include properties adjacent to Neah Bay and the Makah Tribal Center, as well as low-density residential areas south of the Wa'atch River on the Pacific coast and near State Route 112 on the Strait of Juan de Fuca. Recreational users of the OCNMS, the Makah Reservation, and the Olympic National Park could also be affected by noise disturbance. The potential for hunt-related noise, including underwater noise, to disturb wildlife species is addressed in Subsection 4.5, Other Wildlife.

4.11.2 Evaluation Criteria

We used two criteria to determine the potential for adverse effects on sensitive noise receptors under the alternatives. The first is the anticipated intensity and duration of noise produced by hunt-related activities (including vessels, vehicles, and aircraft involved in the hunt, protests, media coverage, and law enforcement, as well as weapons used to strike and/or kill a whale). The second is anticipated noise levels at sensitive sites, as indicated by the distance between noise sources and potential receptors.

4.11.2.1 Noise Generated by Hunt-related Activities

Under the No-action Alternative, noise from vehicles, marine vessels, and aircraft is commonly heard throughout the project area. Other sources of noise include commercial areas, sports fields, logging operations, and the foghorn at Tatoosh Island. Natural sounds, such as those of wind and surf, contribute to high ambient noise levels in portions of the project area, particularly in areas close to the shoreline of the Pacific coast and the Strait of Juan de Fuca. A whale hunt and associated activities (such as monitoring, protests, law enforcement, and weapons discharge) would be expected to result in increased noise levels in the project area. Sources of noise from hunt-related activities would include vessels and aircraft (noise would persist for the duration of each hunt), and firearms and explosive devices (noise would be intense and brief). Noise from automobile traffic would not be expected to increase at nearby properties as a result of implementing any of the action alternatives because daily and monthly traffic counts from the period of the previous hunts did not show an appreciable change in traffic volumes in the project area (Subsection 3.13.3.1.2, Vehicle Traffic Patterns During the 1999 Hunt).

It is possible that the number and types of vessels and aircraft participating in each hunting expedition (including observation, protests, law enforcement, and media coverage) would vary under the action alternatives. For example, Alternative 4 (which would allow hunting during summer) could attract more observers because of better weather conditions, or alternatives that allow more hunts might attract less media coverage as whale hunting becomes less of a novelty. Because of the difficulty of predicting such variations and how they might affect the precise numbers of vessels and aircraft participating in each hunt, this analysis assumes each hunting expedition would be accompanied by the same amount of vessel and aircraft activity and associated noise. Vessels and aircraft associated with each hunt would likely be similar to those associated with the previous hunts, described in Subsection 3.11.3.2.1, Atmospheric Noise. The amount of noise generated by vessels and aircraft under each alternative would depend on the number of days of scouting or hunting that are likely to occur.

Weapons that may be used to strike and kill whales are described in Subsection 3.15.3.5.2, Weapons Associated with the Hunt. The Makah propose to strike and secure a whale with a hand-thrown toggle-point harpoon and to kill it with a .50-caliber rifle. An alternative method for striking a whale would be a hand-thrown darting gun with an explosive grenade. Alternative methods for killing a whale include explosive grenades delivered either by a hand-thrown darting gun or shoulder gun. If a shoulder gun were used, the blast would likely be louder than the noise associated with a rifle. The grenade is designed to detonate after entering the whale. Atmospheric noise from the detonation would be muffled by the surrounding tissue and by the water surrounding the whale and would probably not exceed the noise level of either the rifle or shoulder gun. Underwater noise from the grenade explosion, which would likely be intense, is discussed in Subsection 4.5, Other Wildlife. The amount of noise produced by weapons would depend on the number of whales that may be struck and killed under a given alternative.

4.11.2.2 Noise Levels at Receiving Properties

As a general rule of thumb, sound level in an open environment (such as occurs throughout the project area) drops 6 decibels (dB) for every doubling of the distance from the noise source (Occupational Safety and Health Administration 2013). Thus, if a sound has an intensity of 100 dB 50 feet (15.2 m) from the source (a standard distance for measuring noise output levels), the intensity at 100 feet (30.5 m) would be 94 dB; at a distance of 1 mile (1.6 km), the sound level would be approximately 60 dB. Thus, the potential for noise from hunt-related activities to affect sensitive receptors would depend primarily on the distance between the activities and the receptors. Any activities that occur closer to shore would be more audible than activities further off shore. For example, whale hunting during summer may target whales that are feeding in the project area and may therefore take place closer to shore than hunting during winter or spring, which may target migrating whales further off shore. In addition, most recreational visits occur during summer. Whale hunting activities during summer may be audible to more persons on trails and beaches in the Olympic National Park and the Makah Reservation compared to activities at other times of year. Conversely, hunting restrictions that cause whale hunting to occur farther from shore (e.g., by prohibiting hunters from making an initial strike on a gray whale within 5 miles (8 km) of shore) would reduce the potential for hunt-related activities to be audible to persons on shore.

For firearms, the noise level at a receiving property would also depend on the direction the muzzle is facing at the moment of discharge, because gunfire noise is louder in the direction the weapon is pointed. Weapons discharged intentionally during a whale hunt would be pointed at a downward angle toward the whale:

> The rifleman on the chase boat may not discharge his weapon until authorized to fire by a safety officer designated by the whaling captain. The safety officer would not authorize the discharge of the rifle unless the barrel of the rifle is above and within 30 feet [9.1 m] from the target area of the whale and the rifleman's field of view is clear of all persons, vessels, buildings, vehicles, highways, and other objects or structures that if hit by a rifle shot could cause injury to human life or property (2.3.3.2.7, Other Environmental Protection Measures).

It is reasonable to expect that the direction of fire would be away from commercial or residential areas.

Based on observations of the hunts that took place in 1999 and 2000, most hunting under the action alternatives would be expected to take place 1 to 2 miles (1.6 to 3.2 km) off shore, unless explicitly restricted to other areas (Gosho 1999; Gearin and Gosho 2000). Under any of the action alternatives, noise from vessels and weapons would be audible at few, if any, residential or commercial properties, including the Makah Tribal Center. Recreational users of beaches in the OCNMS, the Makah Reservation, and the Olympic National Park would be most likely to hear noise associated with whale hunts under the action alternatives.

Aircraft engaged in monitoring and law enforcement for the hunt would be audible primarily near vessels engaged in hunt-related activities or other vessels that might be in the vicinity of a hunt, such as recreational fishing vessels. Aircraft within OCNMS boundaries would be expected to observe the requirement to stay above an altitude of 2,000 feet (610 m). Increased noise levels (compared to the No-action Alternative) from aircraft taking off and landing would also be audible at commercial and residential properties near the landing pad at Coast Guard Station Neah Bay. Media helicopters would likely arrive from other areas and would be present only near a successful harvest or major protest activity. Aircraft monitoring hunt-related activities that occurred outside the OCNMS (e.g., events at Neah Bay under all action alternatives) would not have to maintain an altitude of at least 2,000 feet (610 m). For this reason, aircraft noise levels at receiving properties in Neah Bay would likely be louder than those along the Pacific coast portion of the Makah U&A.

The area with greatest potential for disturbance from hunt-related activities under any of the action alternatives is Neah Bay, where most protests and law enforcement activities occurred during the previous hunts. If protest vessels moor at Clallam Bay, as they did during the previous hunts, increased noise levels would also be expected there and possibly along the travel route between Clallam Bay and Neah Bay.

4.11.3 Evaluation of Alternatives

The following subsections consider the potential for the alternatives to affect sensitive noise receptors in the project area. For each alternative, the discussion addresses the potential number of occasions on which hunt-related activity may lead to elevated noise levels, as well as the likelihood that such noise would be detectable at sensitive sites.

The lowest risk of adverse effects on sensitive noise receptors would occur under the No-action Alternative because no whale hunts would be permitted. The risk under the action alternatives would increase, with the amount of increase depending on the number of days of scouting and hunting, the number of rifle shots or grenade explosions, and the distance from shore of hunt-related discharges. Table 4-1 identifies those numbers and Subsection 4.1, Introduction, describes the rationale for expecting those numbers.

Compared to the No-action Alternative, the risk of adverse effects on sensitive noise receptors would increase under any of the action alternatives because of increases in noise from motorized vessels and aircraft on days when tribal members are scouting or hunting for whales. The greatest increases in the risk of adverse effects on sensitive noise receptors would occur under Alternatives 2, 3, and 6, under which hunt-related trips would occur on approximately 60 days from December through May (primarily during the months of March through May). As noted above, much of the hunting-related noise under Alternative 3 would likely be inaudible to sensitive receptors on shore because it would occur more than 5 miles (8 km) from shore. The increased risk of adverse effects on sensitive noise receptors because of increases in noise from motorized vessels would be less under Alternative 5 than under Alternatives 2, 3, and 6 because hunt-related trips would occur on approximately 22 days in December and May. The increased risk would be even less under Alternative 4, under which scouting and hunting would likely occur on only 7 days (albeit during the summer months, when recreational use of trails and beaches would be higher than during the winter and spring months).

Alternative 2 would be expected to result in the greatest increased risk to sensitive noise receptors from weapons discharge, compared to the No-action Alternative, because it would likely result in up to 64 rifle shots or 12 grenade explosions per year, with no restrictions on distance from shore. The increased risk of adverse effects on sensitive noise receptors because of weapons discharge would be less under Alternative 3 because most whale hunting activity would be expected to occur farther off shore than under Alternative 2. The amount of weapons discharge under Alternative 6 would be less than under Alternatives 2 and 3 (16 to 56 rifle shots or 3 to 11 grenade explosions), but there would be no constraints on distance from shore. This amount would be even less under Alternatives 4 and 5 (0 to 16 rifle shots or 0 to 3 grenade explosions), but there would also be no constraints on distance from shore.

4.11.3.1 Alternative 1, No action

Under Alternative 1, no whale hunt would be permitted, and no whale hunting or associated activities would be expected to occur. The amount of noise-generating activity in the project area under the No-action Alternative would not be expected to differ from current levels (described in Subsection 3.11.3.2, Existing Noise Levels).

4.11.3.2 Alternative 2, Tribe's Proposed Action

Under Alternative 2, vessel and aircraft noise associated with hunt-related trips would likely occur on approximately 60 days from December through May, mostly during April and May. Based on estimates of the number of rifle shots or grenade explosions per whale harvested, Alternative 2 would be likely to result in as many as 64 rifle shots or 12 grenade explosions annually. Compared to the No-action Alternative (under which there would be no hunt-related noise), the noise from vessels, aircraft, and weapons discharge would likely result in increased noise levels at receiving properties in Neah Bay on approximately 43 days each spring and possibly 17 days each winter. There could also be increased noise levels at receiving properties along State Route 112, east of Neah Bay, from protest vessels traveling between Clallam Bay and Neah Bay.

In contrast to the No-action Alternative, increased noise from vessels, aircraft, and weapons associated with whale hunts under Alternative 2 may be audible to recreational users of the OCNMS, the Makah Reservation, and the Olympic National Park. The number of recreational visitors who may be affected would be limited, however, because hunting would be restricted to the winter and early spring months when visitation is comparatively low.

4.11.3.3 Alternative 3, Offshore Hunt

Alternative 3 would include the same hunting season and the same limits on the number of whales harvested as Alternative 2, but would prohibit Makah hunters from making an initial strike on a gray whale within 5 miles (8 km) of shore. As under Alternative 2, vessel and aircraft noise associated with hunt-related trips under Alternative 3 would likely occur on approximately 60 days from December through May, mostly during April and May, and there would be as many as 64 rifle shots or 12 grenade explosions annually. Compared to the No-action Alternative (under which there would be no hunt-related noise), the noise from vessels, aircraft, and weapons discharge would likely result in increased noise levels at receiving properties in Neah Bay on approximately 43 days each spring and possibly 17 days each winter. There could also be increased noise levels at receiving properties along State Route 112, east of Neah Bay, from protest vessels traveling between Clallam Bay and Neah Bay. In addition, noise from vessels, aircraft, and weapons associated with whale hunts under Alternative 3 may be audible to recreational users of the OCNMS, the Makah Reservation, and the Olympic National Park, in contrast to the No-action Alternative, which would involve no hunt-related noise.

Compared to Alternative 2, Alternative 3 would be likely to result in a smaller increase in noise levels at receiving properties because most hunt activities would take place farther off shore. Although some hunting activities under Alternative 3 could occur less than 5 miles (8 km) from shore (i.e., if a struck whale moves toward shore, and hunters and chase boats would be required to follow it and dispatch it), it is likely that most hunting activities would occur further off shore than under the other action alternatives because all initial strikes would occur more than 5 miles (8 km) off shore.

It is possible that Alternative 3 could result in slightly greater increases in noise levels in Neah Bay and other areas where hunt-related vessels are moored compared to Alternative 2. This is because the number of motorized vessels engaged in each hunt-related trip would likely be greater, based on the expectation that the hunting party would likely be in a motorized vessel rather than a canoe (Subsection 4.1.3.2, Potential Number and Type of Vessels [Alternative 3]). For much of each trip, however, hunt-related vessels would be 5 or more miles (8 or more km) off shore, where they would likely be inaudible to sensitive receptors on shore. In addition, any potential increases in the number of motorized vessels in the hunting party could be offset by a reduction in the number of jet skis used by interested observers, because jet skis may not have sufficient range for an offshore hunt.

4.11.3.4 Alternative 4, Summer/Fall Hunt

Under Alternative 4, the hunting season would extend from June 1 through November 30 instead of December through May. The maximum number of whales harvested would be limited to one ENP male whale per year under current conditions. Based on the expectation that locating and striking a known

ENP male would take no more than 7 days (Subsection 4.1.4, Alternative 4), vessel and aircraft noise associated with scouting and hunting would be likely to occur on approximately 7 days per year. Alternative 4 may result in as many as 16 rifle shots or 3 grenade explosions annually, although those values could be much lower if tribal hunters are unable to locate and strike a known ENP male or if a whale is struck and lost (in which case the hunt would be ended for the year).

Compared to the No-action Alternative (under which there would be no hunt-related noise), noise from vessels, aircraft, and weapons discharge would likely result in increased noise levels at receiving properties in Neah Bay on a maximum of 7 days. There could also be increased noise levels at receiving properties along State Route 112, east of Neah Bay, from protest vessels traveling between Clallam Bay and Neah Bay. In addition, noise from vessels, aircraft, and weapons associated with whale hunts under Alternative 4 may be audible to recreational users of the OCNMS, the Makah Reservation, and the Olympic National Park, in contrast to the No-action Alternative, which would involve no hunt-related noise.

Alternative 4 would have a greater potential to result in the disturbance of recreational users in the project area than any of the other action alternatives because whale hunts would likely occur during the peak period of recreational use and may target whales that are feeding relatively close to shore (compared to whales that are migrating farther off shore at other times of year). The elevated potential for disturbance would occur on fewer days, however (e.g., 7 days under Alternative 4 versus 60 days under Alternative 2).

4.11.3.5 Alternative 5, Split-season Hunt

Under Alternative 5, the hunting season would be 3 weeks in December and 3 weeks in May, in contrast to the 6-month-long hunting seasons under the other action alternatives. In addition, the landing of a single PCFG whale, or the striking and losing of a single whale, would end the hunt for any given year. Based on the constraints imposed by the hunting season and the PCFG mortality limit, it is expected that the Tribe would harvest up to one whale per year (Subsection 4.1.5, Alternative 5).

Based on the length of the hunting season, vessel and aircraft noise associated with hunt-related trips would likely occur on approximately 22 days in December and May, mostly during May. These values could decrease to 0 in years in which the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale. Based on estimates of the number of rifle shots or grenade explosions per whale harvested, Alternative 5 would be likely to result in as many as 16 rifle shots or 3 grenade explosions annually, or as few as 0 rifle shots and grenade explosions during years in which the hunt is on hiatus.

Compared to the No-action Alternative (under which there would be no hunt-related noise), the noise from vessels, aircraft, and weapons discharge would likely result in increased noise levels at receiving properties in Neah Bay and along State Route 112 east of Neah Bay on approximately 17 days each spring and possibly 5 days each winter. In addition, noise from vessels, aircraft, and weapons associated with whale hunts under Alternative 5 may be audible to recreational users of the OCNMS, the Makah Reservation, and the Olympic National Park, in contrast to the No-action Alternative, which would involve no hunt-related noise.

Compared to Alternatives 2 and 3, Alternative 5 would be expected to result in fewer days with hunt-related trips (22 compared with 60) and therefore a smaller increase (compared to the No-action Alternative) in aircraft and vessel noise at receiving properties. Similarly, Alternative 5 would result in a smaller increase in noise from weapons discharges because of the smaller number of discharges. Compared to Alternative 4, Alternative 5 would result in more days of hunt-related trips (22 compared with 7) and similar numbers of weapons discharges (0 to 16 rifle shots and 0 to 3 grenade explosions) and would therefore result in a slightly greater increase in noise.

4.11.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Under Alternative 6, the waiver and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

Alternative 6 would have the same conditions as Alternative 2 regarding the hunt area, season, and methods and would, therefore, result in the same number of scouting and hunting days. Alternative 6 would include greater restrictions than Alternative 2 on the maximum number of whales that could be killed per year and per 2 years. Based on estimates of the number of rifle shots or grenade explosions per whale harvested, Alternative 6 would be likely to result in as many as 56 rifle shots or 11 grenade explosions annually.

Compared to the No-action Alternative (under which there would be no hunt-related noise), the noise from vessels, aircraft, and weapons discharge would likely result in increased noise levels at receiving properties in Neah Bay and along State Route 112 east of Neah Bay on approximately 60 days (likely 43 days in spring and possibly 17 days in winter), the same as under Alternatives 2 and 3. In addition, noise from vessels, aircraft, and weapons associated with whale hunts under Alternative 6 may be audible to recreational users of the OCNMS, the Makah Reservation, and the Olympic National Park, in contrast to the No-action Alternative, which would involve no hunt-related noise. Based on the anticipated number of weapons discharges, Alternative 6 would result in a smaller increase in noise from weapons discharges than Alternative 2 or Alternative 3 and a larger increase than Alternative 4 or Alternative 5.

4.12 Aesthetics

4.12.1 Introduction

This subsection addresses the potential for the alternatives to result in adverse aesthetic effects on observers, based on the potential for viewers to see the whale hunt, either directly or through the media. Media images of the previous hunt prompted reactions ranging from revulsion to admiration. Analyses in this subsection consider the effects on observers who may be present at sites with direct views of a whale hunt (including views of a whale dying, being towed to shore, and/or being butchered), as well as those who may see such images through various media outlets. Whale hunting and related activities under the action alternatives would be short term and localized, and would take place upon the water; such activities, therefore, would not affect natural visual resources in the project area, such as stacks, pillars, and islands (Subsection 3.12.3.1, Visual Resources in the Project Area).

4.12.2 Evaluation Criteria

We used two criteria to determine the potential for aesthetic effects under the alternatives. The first is the anticipated number of persons who may be present at sites that may offer views of hunt-related activities, as well as their expectations (that is, whether individuals may encounter views of hunt-related activities without intending to do so). The second criterion includes the anticipated amount, intensity, duration, scope, and content of media coverage. The following two subsections discuss these matters in greater detail and identify how the effects of the alternatives may be assessed and differentiated.

4.12.2.1 On-scene Observers

Analyses in this subsection consider two groups of potential observers: interested observers and casual observers. Interested observers include those who would actively seek viewing opportunities out of concern about the outcome of the hunt, as well as persons engaged in monitoring, law enforcement, and media coverage. Casual observers include persons, such as recreational users in portions of the OCNMS, Olympic National Park, and Makah Reservation, who may encounter views of hunt-related activities without expecting to do so.

Under any of the alternatives, the number of opportunities for interested observers to view whale hunts would depend on the number of days on which hunting occurs, as well as the distance of hunting from shore. On days with hunting, interested observers would have the opportunity to view a whale being hunted, towed to shore, or butchered; no such opportunities would occur on days when no hunting occurs. (Note that analyses in this subsection focus on days of actual hunting, rather than hunt-related activities (i.e., hunting or scouting), because there would be no opportunities to view a whale being hunted, towed to shore, or butchered on days when only scouting occurs.) Based on observations of the hunts that took place in 1999 and 2000, most hunting under the action alternatives would be expected to take place 1 to 2 miles (1.6 to 3.2 km) off shore, unless explicitly restricted to other areas. At this distance, hunt activities would be visible from few, if any, land-based vantage points. Any activities that occur closer to shore (e.g., towing a harvested whale to shore and butchering it) would be more readily viewed. Also, hunting that occurs during the summer (i.e., under Alternative 4) would likely target whales that are feeding in the project area, and may therefore take place closer to shore than hunting that targets migrating whales further off shore.

As with interested observers, the number of opportunities for casual observers to view whale hunts would depend on the number of days on which hunting occurs and the distance of hunting from shore. In addition, the number of casual observers who could see hunt activity on the water (including pursuits, strikes, and possibly the death of a whale) would vary seasonally, with the greatest number of potential observers during the peak visitation period from June through September. The potential for inadvertent encounters with views of whale hunting would occur mostly from hiking trails and beaches along the Pacific coastal portion of the project area, and from a limited number of road-based locations on the Makah Reservation (Subsection 3.12.3.2, Vantage Points and Viewing Opportunities). Similar to interested observers, casual observers would be able to view hunt activities from few, if any, land-based vantage points.

The number of potential observers (interested or casual) for a whale carcass being towed to shore and butchered would depend in part on the location of the beach to which the whale is brought. The whale that was harvested in 1999 was brought to Neah Bay, where butchering and harvest-related ceremonies and celebrations were readily observable by numerous tribal members, local residents, protesters, enforcement personnel, and media representatives. Alternative locations where a whale carcass may be brought to shore and butchered would likely be along the Pacific coast portion of the Makah Reservation at sites that are far less prominent and accessible than Neah Bay. Under Alternative 4, which would allow whale hunting during the months of peak recreational use, there would be a greater potential for recreational users of such areas to encounter views of a whale carcass without actively seeking such views.

4.12.2.2 Media Viewers

As described in Subsection 3.12.3.3, Media Coverage of Previous Authorized Hunts, previous Makah whale hunts were the focus of intense coverage in local and regional newspapers, television broadcasts, and other media outlets. Stories and images of the hunt were also distributed nationwide and internationally. As with the previous hunts, media coverage would be expected to include images of hunt activities, protests, and public ceremonies and celebrations, as well as of a whale being struck, killed, brought to shore, and butchered.

The amount of media coverage would depend on the amount of hunt-related activity, which in turn would depend primarily on the number of days with hunt-related trips (including both hunting and scouting). It is possible that media coverage would be more intense for initial hunts, and would diminish as subsequent hunts occur. Even if that were to occur, alternatives that result in more days with hunt-related trips would still be likely to result in more media coverage overall.

4.12.3 Evaluation of Alternatives

The following subsections consider the potential for the alternatives to result in aesthetic effects on observers. For each alternative, the discussion addresses the potential number of on-scene observers who might view whale-hunting activities and the amount of media coverage.

The lowest risk of adverse aesthetic effects to casual observers would occur with the No-action Alternative, under which no whale hunts would be permitted. The No-action Alternative, however, would have adverse aesthetic effects on interested observers who desire to view a hunt. Under all of the action alternatives, interested observers could view a whale being hunted, towed to shore, or butchered from numerous points along the shoreline near Neah Bay and, to a lesser degree, the Pacific coast portion of the Makah U&A. Viewers not desiring to see a hunt, such as recreational users in the portions of the OCNMS, Olympic National Park, and Makah Reservation, may encounter views of hunt-related activities without expecting to do so (Subsection 3.12.3.2, Vantage Points and Viewing Opportunities).

4.12.3.1 Alternative 1, No Action

Under the No-action Alternative, no whale hunt would be permitted and no whale hunting or associated activities (e.g., ceremonies, celebrations, protests, or law enforcement) would be anticipated. Therefore, there would be no potential to view hunt-related activities in the project area or through the media. With the possible exception of drift whales, no whale carcasses would be encountered by interested observers or recreational users of area beaches, trails, or campsites. Those desiring to view a hunt would not have the opportunity under this alternative.

4.12.3.2 Alternative 2, Tribe's Proposed Action

Under Alternative 2, whale hunts would likely occur on approximately 43 days from December through May, primarily during March through May. Hunts might be visible to observers at beaches and vantage points along the Pacific coast portion of the project area. Hunt-related activities would take place during the winter and spring when recreational use of these areas is typically lower than during the summer months. Compared to the No-action Alternative, Alternative 2 would result in an increased potential for persons in the project area to view (intentionally or unintentionally) a whale being hunted, towed to shore, or butchered. This increased potential would occur on approximately 33 days per year. The number of potentially affected casual observers would be limited by the timing of the hunt during periods of relatively low visitation.

As occurred in 1999 and 2000, whale hunts and associated activities (including protests and law enforcement) would likely receive extensive coverage in various media outlets. Such episodes of elevated media attention would be expected to occur on 60 days with hunt-related trips (including scouting) under Alternative 2. Public response would likely be substantial, expressing a wide range of opinions (Subsection 3.12.3.3, Media Coverage of Previous Authorized Hunts).

4.12.3.3 Alternative 3, Offshore Hunt

Under Alternative 3, whale hunts would likely occur on approximately 43 days (Subsection 4.1.3.1, Potential Timing of a Hunt and Number of Hunting Days [Alternative 3]). As under Alternative 2, hunt-related activities would take place during the winter and spring when recreational use of the project area is typically lower than during the summer months. In contrast to the other action alternatives, under Alternative 3, Makah hunters would be prohibited from making an initial strike on a gray whale within 5 miles (8 km) of shore. This would essentially eliminate the potential for persons at land-based vantage points in the project area to view a hunt, either intentionally or unintentionally. In addition, this restriction could limit the number of interested observers who seek to view the hunt from the water on jet skis, because jet skis may not have sufficient range for an offshore hunt. Compared to the No-action Alternative, Alternative 3 would therefore result in an increased potential for persons in the project area to view (intentionally or unintentionally) a whale being hunted, towed to shore, or butchered. This increased potential would occur on approximately 43 days per year. The area with this increased potential would likely be limited to Neah Bay or other locations where a harvested whale might be towed to shore and butchered.

Compared to Alternative 2, Alternative 3 would likely result in a similar number of days with hunt-related trips (60) and therefore the same opportunities for observers at beaches and vantage points along the Pacific coast portion of the project area to inadvertently view hunting activities located close to shore (e.g., scouting or towing a killed whale). Therefore, compared to the No-action Alternative, Alternative 3 would have a similar potential for observers to view some hunt activities as Alternative 2.

As occurred in 1999 and 2000, whale hunts and associated activities (including protests and law enforcement) would likely receive extensive coverage in various media outlets. As under Alternative 2, such episodes of elevated media attention would be expected to occur on 60 days with hunt-related trips. Public response to media coverage would likely be substantial, with a variety and intensity of response similar to that described in Subsection 3.12.3.3, Media Coverage of Previous Authorized Hunts. Because there would be the same number of days with hunt-related trips under Alternative 3 as under Alternative 2, Alternative 3 would likely result in a similar increase in the number of media broadcasts over the No-action Alternative compared to Alternative 2.

4.12.3.4 Alternative 4, Summer/Fall Hunt

Under Alternative 4, whale hunts would likely occur on approximately 7 days from June through November. Hunts might be visible to observers at beaches and vantage points along the Pacific coast portion of the project area. In contrast to the other action alternatives, hunt-related activities under Alternative 4 would likely take place during summer when recreational use of these areas is typically at its peak. In addition, whale hunting would target PCFG whales that are feeding in the project area, and may therefore take place closer to shore than hunting that targets migrating whales further off shore. Compared to the No-action Alternative, Alternative 4 would result in an increased potential for persons in the project area to view (intentionally or unintentionally) a whale being hunted, towed to shore, or butchered. This increased potential would occur on approximately 7 days per year.

Compared to the other action alternatives, Alternative 4 would likely result in fewer days of hunt-related trips (7 versus 22 to 60) and therefore fewer opportunities for observers at beaches and vantage points along the Pacific coast portion of the project area to view hunting activities. However, the number of potential casual observers present in the project area on any given day of hunting would be greater under Alternative 4 than under the other action alternatives because hunting would occur during the summer months when recreational use of the project area is higher. Compared to the other action alternatives, therefore, Alternative 4 would result in a smaller increase, relative to the No-action Alternative, in the number of opportunities for observers (interested or casual) to witness hunt-related activities, but a greater potential for casual observers to inadvertently encounter sights of a whale being hunted, towed to shore, or butchered.

As occurred in 1999 and 2000, whale hunts and associated activities (including protests and law enforcement) would likely receive extensive coverage in various media outlets. Under Alternative 4, such episodes of elevated media attention would be expected to occur on 7 days with hunt-related trips.

Public response to media coverage would likely be substantial, with a variety and intensity of response similar to that described in Subsection 3.12.3.3, Media Coverage of Previous Authorized Hunts. Because there would be fewer days with hunt-related trips under Alternative 4 compared to Alternatives 2 and 3, Alternative 4 would likely result in a smaller increase in the number of media broadcasts over the No-action Alternative compared to Alternatives 2 and 3.

4.12.3.5 Alternative 5, Split-season Hunt

Under Alternative 5, hunting would likely occur during 3 weeks in December and 3 weeks in May, with a likely total of 11 days of hunting. Hunts might be visible to observers at beaches and vantage points along the Pacific coast portion of the project area. Compared to the No-action Alternative, Alternative 5 would result in an increased potential for persons in the project area to view (intentionally or unintentionally) a whale being hunted, towed to shore, or butchered. This increased potential would occur on approximately 11 days per year, although it could be as low as 0 days in years in which the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale.

Compared to Alternatives 2, 3, and 6, Alternative 5 would likely result in fewer days of hunt-related trips, including scouting days,(22 versus 60) and therefore fewer opportunities for observers at beaches and vantage points along the Pacific coast portion of the project area to view hunting activities. Alternative 5 would result in more days of hunt-related trips than Alternative 4 (22 versus 7), but those days would occur during the winter and spring months when recreational use of the project area is comparatively low. Compared to the other action alternatives, therefore, Alternative 5 would likely result in a smaller increase, relative to the No-action Alternative, in the potential for casual observers to inadvertently encounter sights of a whale being hunted, towed to shore, or butchered.

As occurred in 1999 and 2000, whale hunts and associated activities (including protests and law enforcement) would likely receive extensive coverage in various media outlets. Under Alternative 5, such episodes of elevated media attention would be expected to occur on 22 days with hunt-related trips. Public response to media coverage would likely be substantial, with a variety and intensity of response similar to that described in Subsection 3.12.3.3, Media Coverage of Previous Authorized Hunts. Because there would be fewer days with hunt-related trips under Alternative 5 compared to Alternatives 2, 3, and 6, Alternative 5 would likely result in a smaller increase in media broadcasts than those alternatives, as compared to the No-action Alternative. Because there would be more days with hunt-related trips under Alternative 5 compared to Alternative 4, Alternative 5 would likely result in a greater increase in media broadcasts than Alternative 4, as compared to the No-action Alternative.

4.12.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Also, under Alternative 6, the waiver and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

Alternative 6 would include the same provisions as Alternative 2 for the timing and location of the hunt and would, therefore, be expected to result in the same number of days with hunting (33) and with hunt-related trips (i.e., 60 days of hunting or scouting). Compared to the No-action Alternative, therefore, Alternative 6 would result in an increased potential for persons in the project area to view (intentionally or unintentionally) a whale being hunted, towed to shore, or butchered. As under Alternative 2, this increased potential would likely occur on approximately 33 days per year, primarily during winter and spring when recreational use of the project area is typically lower than during the summer months. Also as under Alternative 2, episodes of elevated media attention would be expected to occur on 60 days with hunt-related trips. Public response to media coverage would likely be substantial, with a variety and intensity of response similar to those described in Subsection 3.12.3.3, Media Coverage of Previous Authorized Hunts.

4.13 Transportation

4.13.1 Introduction

This subsection addresses the potential for a whale hunt and hunt-related activities in the project area to interfere with normal traffic patterns on highways, marine waters, and air routes near Neah Bay. In addition, the analysis addresses the potential for changes in traffic patterns to result in an increased risk of traffic accidents or to impede access by emergency services.

4.13.2 Evaluation Criteria

For this analysis, transportation resources in the project area are subdivided into three categories: land, water, and air. We used two criteria to determine the potential for effects on transportation under the alternatives. The first is the extent to which a particular alternative may affect traffic volumes or impede the movement of vehicles, vessels, or aircraft. Because each hunt would be expected to result in the same change in highway, marine, and air traffic volumes in the project area, the change in traffic would depend primarily on the amount of hunt-related activity. The amount of hunt-related activity would vary depending on the number of days with hunt-related trips. Table 4-1 identifies the anticipated number of days with hunt-related trips under each alternative and Subsection 4.1, Introduction, describes the rationale for those numbers.

The analysis also considers whether changes in traffic patterns under each alternative might result in an increased risk of traffic accidents or might impede access by emergency services. An alternative would be more likely to result in problems if it impeded or created a substantial increase in traffic during a time of year when volumes were higher than average. The following subsections describe the potential effects of each alternative on transportation, based on the extent and timing of traffic changes in each of the three transportation resource categories.

4.13.2.1 Highway Traffic

Based on experience with whale hunts in past years, it is unlikely that whale-hunt-related activities under the action alternatives would have a detectable effect on highway traffic volumes in the project area. For example, automated traffic count data for Highway 101 during the month of May 1999 (when the most recent successful hunt occurred) do not indicate any anomalous spikes in traffic volume during the days surrounding the hunt and subsequent events (Table 3-41).

As noted in Subsection 3.13.3.1.2, Vehicle Traffic Patterns During the 1999 Hunt, previous hunts affected highway traffic flow in the project area on one occasion when protesters and local police responding to them blocked traffic on State Route 112 for approximately 2.5 hours. The likelihood of a blockage occurring under the action alternatives cannot be predicted, but the potential for such an occurrence would be expected to increase with the number of days with hunt-related activities. Table 4-1 identifies the anticipated number days with hunt-related activities under each alternative. The intensity of any roadway blockage would depend on the time of year during which it occurred. Therefore, hunts that occur during the peak travel season (June through September) (Figure 3-14) would affect more travelers and have a greater risk of impeding emergency vehicles compared to hunts during other times of year. Summer is also the period with the greatest number of visitors to the Makah Reservation (Subsection 3.13.3.1.1, Typical Vehicle Traffic Volume Patterns). A road blockage during summer would also be expected to have a greater impact on access to the reservation than a blockage at other times of year.

4.13.2.2 Marine Traffic

Accounts from previous hunts indicated that protesters operated approximately 15 vessels near hunt activities, including Neah Bay and Sekiu (Subsection 3.15.3.4, Behavior of People Associated with the Hunt). There were no reports of whale hunting or protest vessels hindering the passage of commercial or recreational fishing vessels, or of marine accidents associated with hunt-related traffic. The incident in 2000, in which a protester on a jet ski collided with a Coast Guard vessel enforcing the MEZ, was a direct result of the actions of the parties involved, rather than a byproduct of increased traffic volume.

Hunt-related activities would be unlikely to interfere with commercial shipping traffic, because most (if not all) hunting would probably occur within the Coast Guard RNA, which lies almost entirely within the OCNMS area to be avoided. Commercial shipping traffic largely honors the area to be avoided (Subsection 3.6.3.1.4, Commercial Shipping) and would, therefore, be unlikely to encounter any hunt-related vessels.

The only area where commercial shipping traffic could reasonably be expected to encounter hunt-related marine traffic is in the Strait of Juan de Fuca, because the area to be avoided does not extend eastward of Neah Bay on Cape Flattery. Because no hunting would be allowed in the Strait of Juan de Fuca, the potential for encounters between commercial shipping traffic and hunt-related vessels in the Strait of Juan de Fuca under any of the action alternatives would be very limited. Hunt-related marine traffic in the Strait of Juan de Fuca could consist of: 1) protest vessels, 2) hunting crews and support vessels transiting the approximately 9-mile (14.5-km) run between Neah Bay and coastal waters west of Cape Flattery, and 3) hunting crews and support vessels pursuing a harpooned whale travelling into the Strait of Juan de Fuca from the coastal hunt area. Protest or hunt-related vessels traveling between Sekiu[16] and Neah Bay or Neah Bay and the open ocean would be unlikely to encounter commercial shipping traffic, however, because they would be expected to remain fairly close to shore (i.e., within 1 mile/1.6 km). Traffic lanes for commercial ships in the Strait of Juan de Fuca are generally 3 to 4 miles (4.8 to 6.4 km) from the northern shore of the Olympic Peninsula. The likelihood for protest- or hunt-related vessel traffic to interfere with commercial shipping traffic in the Strait of Juan de Fuca under any of the alternatives would therefore be very low, because most vessel traffic would be unlikely to occur in commercial shipping lanes. During the 1999 hunt, it took 8 minutes between the time the whale was harpooned and the fatal shot. Therefore, in the case that a harpooned whale is pursued into the Strait of Juan de Fuca, it is likely that any vessel interactions would be of very limited duration. Vessel traffic in areas south of the traffic lanes would have the potential to interfere with slow-moving vessels, such as small fishing vessels and tugs with barges, which are allowed to travel in waters south of the commercial traffic lanes. Any instances of interference would likely occur over a matter of minutes and would not be likely to have appreciable effects on the ability of slow-moving vessels to pass through the Strait of Juan de Fuca.

[16] During the hunts that took place in 1998 and 1999, several protest vessels moored in Sekiu, approximately 20 miles (32.2 km) east of Cape Flattery in the Strait of Juan de Fuca.

While it is possible that vessels engaged in hunts, protests, media coverage, or law enforcement could interfere with vessels entering or leaving Neah Bay, the likelihood of such interference occurring under the action alternatives cannot be predicted. The potential for interference or marine accidents would depend primarily on the number of days with hunt-related activities (Table 4-1). The potential for interference would also depend on the time of year that hunting occurs. As noted in Subsection 3.13.3.2, Marine Vessel Traffic, approximately 80 percent of all boat trips (commercial and recreational) from Neah Bay occur during the months of May through August. Approximately 6 percent of all trips occur during the 5-month period from November through March, and 4 percent occur during April. Hunt-related activities that occur during the summer peak period for marine traffic would have a greater potential to affect commercial or recreational fishing vessel traffic, compared to activities at other times of year. If the number of boat trips from Neah Bay continues to increase at a rate similar to what has been observed in recent years (Table 3-42), the likelihood of hunt-related vessel traffic interfering with other marine traffic (particularly recreational fishing trips) would likewise be expected to increase.

4.13.2.3 Air Traffic

There is no indication from accounts of previous hunts that law enforcement or media aircraft interfered with air traffic in the project area. The likelihood of such interference occurring under the action alternatives cannot be predicted, but the potential would be expected to increase each time a hunt-related trip occurs. Hunt-related activities that occur during a peak period for aircraft use would have a greater potential to affect air traffic, compared to activities at other times of year. No data are readily available to quantify seasonal differences in air traffic in the project area, but the peak period of aircraft use likely coincides with the summer months when conditions of low wind and good visibility are relatively common.

4.13.3 Evaluation of Alternatives

The following subsections consider the potential for the alternatives to affect transportation in the project area. For each alternative, the discussion addresses the anticipated increases in the volume or patterns of highway, marine, and air traffic in the project area, as well as changes in the risk of traffic accidents and the potential for highway blockages to interfere with emergency vehicles. The lowest risk of adverse effects on transportation would occur with the No-action Alternative, under which no whale hunts would be permitted and traffic volumes and patterns on highways, marine waters, and air routes near Neah Bay would not be expected to differ from their current levels. Under all of the action alternatives, elevated levels of marine and air traffic associated with whale hunts would have the potential to interfere with normal traffic patterns and could result in an increased risk of accidents relative to the No-action Alternative. Although none of the alternatives would be likely to increase the volume of highway traffic, it is possible there could be road blockages associated with protests and ensuing law enforcement responses, creating the possibility of traffic accidents or impediments to access by emergency services.

During each hunt, there would be an increased likelihood, relative to the No-action Alternative, that protests and/or ensuing law enforcement responses could result in highway blockages; vessels involved in the hunt, protests, media coverage, and law enforcement could interfere with fishing or shipping traffic; or aircraft involved in law enforcement or media coverage could interfere with other air traffic in the project area. The number of occasions on which this potential would exceed conditions under the No-action Alternative would correspond to the number of days on which hunt-related trips would occur under a particular alternative.

The risk of adverse effects on transportation would also be related to the time of year in which whale hunting takes place. Alternatives that allow whale hunting during summer months would be more likely to affect commercial and recreational fishing boat trips from Neah Bay. Similarly, changes in traffic patterns as a result of highway blockages could have a greater effect during summer months when traffic volumes are typically higher.

4.13.3.1 Alternative 1, No Action

Under the No-action Alternative, no whale hunt would be permitted and no whale hunting or associated activities (e.g., protests, law enforcement, or media coverage) would be expected to occur. Traffic volumes in the project area would not be expected to differ from current levels. There would be no potential for hunt-related activities to interfere with highway, marine, or air traffic or to result in an elevated risk of accidents or impede access by emergency vehicles.

4.13.3.2 Alternative 2, Tribe's Proposed Action

Under Alternative 2, hunt-related trips would be expected to occur on approximately 60 days from December through May, primarily during April and May. Compared to the No-action Alternative, increased vessel and air traffic associated with whale hunts under Alternative 2 would result in an increased potential for interference with marine or air traffic in the project area and, possibly, an increased risk of accidents. Potential highway blockage resulting from protest activities and law enforcement response could result in traffic accidents or impediments to emergency vehicles. During each day with hunt-related activities, there would be an increased likelihood (relative to the No-action Alternative) that protests and/or ensuing law enforcement responses could result in highway blockages; vessels involved in the hunt, protests, media, and law enforcement could interfere with fishing or shipping traffic; or aircraft involved in law enforcement or media coverage could interfere with other air traffic in the project area. These risks would occur on approximately 60 days per year, most likely during April and May, compared to no occurrences under the No-action Alternative.

Because whale hunting under Alternative 2 would be limited to the winter and early spring months, it would not overlap the peak periods for highway and air traffic. If most hunts take place during April and May, they would overlap the period during which there is a high volume of marine vessel traffic, particularly for recreational fishing in May. More boat trips from Neah Bay occur during the months of June through August (combined) compared to May, however (Figure 3-16).

4.13.3.3 Alternative 3, Offshore Hunt

Alternative 3 would include the same hunting season as Alternative 2 and would, therefore, result in the same increased potential, compared to the No-action Alternative, for interference with marine or air traffic in the project area and risk of highway traffic accidents or impediments to emergency vehicles. During each day with hunt-related activities, there would be an increased likelihood (relative to the No-action Alternative) that protests and/or ensuing law enforcement responses could result in highway blockages; vessels involved in the hunt, protests, media coverage, and law enforcement could interfere with fishing or shipping traffic; or aircraft involved in law enforcement or media coverage could interfere with other air traffic in the project area. These risks would occur on approximately 60 days from December through May (most likely throughout the year).

Hunting would take place farther off shore under Alternative 3 than under the other action alternatives because Makah hunters would be prohibited from making an initial strike on a gray whale within 5 miles (8 km) of shore. This would not be likely to affect the potential for interference with commercial shipping traffic, however, because most of the OCNMS area to be avoided extends more than 20 miles (32.2 km) off shore, and safety considerations and logistical constraints would likely keep hunting vessels as close as possible to the 5-mile (8-km) limit.

4.13.3.4 Alternative 4, Summer/Fall Hunt

Under Alternative 4, the hunting season would extend from June 1 through November 30 instead of December through May. Based on the expectation that locating and striking a known ENP male would take no more than 7 days (Subsection 4.1.4, Alternative 4), hunt-related trips under Alternative 4 would be likely to occur on approximately 7 days per year. Compared to the No-action Alternative, therefore, Alternative 4 would result in an increased potential for interference with marine or air traffic in the project area and increased risk of highway traffic accidents or impediments to emergency vehicles on approximately 7 days per year. Compared to the other action alternatives, this increased potential would occur on fewer days per year (7 versus 22 to 60).

Hunting activities under Alternative 4 would likely take place during the summer, when highway, vessel, and air traffic are highest. Whale hunts during the summer months would thus have a greater potential to affect traffic compared to activities at other times of year. Compared to the other action alternatives, therefore, Alternative 4 would result in a smaller increase, relative to the No-action Alternative, in the number of occasions on which hunt-related activities could increase the potential for interference with highway, vessel, and air traffic, but a greater potential for each occasion to result in interference.

4.13.3.5 Alternative 5, Split-season Hunt

Under Alternative 5, the hunting season would be limited to 3 weeks in December and 3 weeks in May, in contrast to the 6-month-long hunting seasons under the other action alternatives. In addition, the landing of a single PCFG whale, or the striking and losing of a single whale, would end the hunt for any given year. Based on the length of the hunting season, Alternative 5 would likely result in approximately 22 days per year with hunt-related trips. This could decrease to 0 days in years in which the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale. Compared to the No-action Alternative (under which there would be no hunt-related vessel traffic), Alternative 5 would therefore result in an increased potential for interference with marine or air traffic in the project area and increased risk of highway traffic accidents or impediments to emergency vehicles on approximately 22 days per year. Compared to Alternatives 2, 3, and 6, this increased potential would occur on fewer days per year (22 versus 60). Compared to Alternative 4, this increased potential would occur on more days per year (22 versus 7).

The increased potential for interference, accidents, or impediments would be limited to the months of December and May (more likely during May), outside of the peak periods for highway and air traffic. As under Alternatives 2 and 3, hunt-related trips during May would have a higher potential for interference with recreational fishing vessel traffic than trips during December.

4.13.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Also, under Alternative 6, the waiver and implementing regulations would lapse after 10 years and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

Alternative 6 would be expected to result in the same number of days with hunt-related trips (60) as Alternative 2 and would include the same restrictions on hunting area and season. Thus, the increased potential for interference with marine or air traffic in the project area and risk of highway traffic accidents or impediments to emergency vehicles would be the same as under Alternative 2, compared to the No-action Alternative.

4.14 Public Services

4.14.1 Introduction

This subsection addresses the potential for the alternatives to affect public services in the project area. This subsection analyzes the potential for a whale hunt and hunt-related activities to impede the ability of law enforcement to maintain order, and medical professionals and facilities to treat injuries. Subsection 4.13, Transportation, discusses the potential for the alternatives to have transportation-related effects on access by emergency vehicles.

4.14.2 Evaluation Criteria

We used two criteria to determine the potential for effects on public services under the alternatives. The first is the anticipated number of events requiring the attention of law enforcement personnel, and the second is the anticipated number of events requiring the attention of medical personnel.

4.14.2.1 Law Enforcement

Activities by protesters or counter-protesters could result in conflicts or legal infractions that would require intervention by law enforcement agents at sea or on land. A sudden, unanticipated increase in the number or frequency of such incidents could overwhelm the ability of local law enforcement personnel or facilities to respond. Even if such an occurrence were prevented through careful planning and coordination, hunt-related incidents could divert law enforcement resources from other missions. An increase in traffic incidents requiring law enforcement intervention could also divert law enforcement resources from other missions. Subsection 4.13.3, Evaluation of Alternatives [Transportation], also evaluates the potential for the alternatives to result in changes in traffic incidents, which could require law enforcement intervention or medical response.

As with the previous hunts, a law enforcement task force (Subsection 3.14.3.2, Police) would probably be assembled to ensure public safety during any whale hunts permitted under the action alternatives. We evaluated the enforcement response during the previous hunts in 1999 and 2000, and made inquiries with various non-tribal enforcement agencies. Based on that information, we expect that the following entities would likely commit resources to any future whale hunt: U.S. Coast Guard, National Marine Fisheries Service, Washington Fish and Wildlife Police, and Clallam County Sheriff. The task force would coordinate county, state, federal, and tribal authorities' efforts to address any potential public disturbances related to whale hunts. Planning undertaken by the previous whale hunt task force included logistics (including assuring the availability of adequate staffing, equipment, and facilities), communications, interagency cooperation, crowd control, and establishment of incident command systems. Similar planning would most likely precede any whale hunts under the action alternatives, reducing the potential for hunt-related incidents to overwhelm law enforcement personnel or facilities.

As noted in Subsection 3.14.3.2, Police, the Clallam County Sheriff's Office did not find that the previous hunts and associated activities imposed a substantial burden on staff. The reported increase in traffic stops by the Washington State Patrol on State Route 112 in 1999 could have been related to the Makah whale hunt, but it is not possible to determine from the available data whether that increase occurred before, during, or after the period of the whale hunt. There is no evidence of an increase in traffic volumes or the number of collisions on project area highways during the years in which previous hunts or practice exercises took place (Subsection 4.13.2.1, Highway Traffic [Evaluation Criteria]). Because there is no clear indication of an increase in traffic stops or collisions as a result of previous hunting activities, it is reasonable to conclude there would be no substantial increases in these rates in the project area under any of the alternatives.

During the previous Makah whale practice exercise in 1998 and hunts in 1999 and 2000, Coast Guard personnel were responsible for ensuring the safety of persons and vessels near the hunt, which included enforcing the MEZ around Makah whale hunt vessels. The Coast Guard used helicopters, a cutter, and several utility boats and Zodiacs, and issued citations for negligent vessel operations, MMPA take violations, and violations of the MEZ (Subsection 3.14.3.1, Coast Guard). The Coast Guard would likely resume these activities under any of the action alternatives. In addition to participating in law enforcement activities, the Coast Guard would likely be the first to respond to any incidents requiring search and rescue in marine waters, for example, if a vessel capsized because of inclement weather or a collision. The risk of such events occurring would probably be greater under alternatives that restricted whale hunting to winter and spring (i.e., Alternatives 2, 3, 5, and 6), when adverse weather and sea conditions would more likely occur (Subsection 4.15.2.2, Injury from Boating Accidents). As noted in Subsection 3.14.3.1, Coast Guard, most search and rescue cases occur during the summer months when sports fishers and tourists are present in greatest numbers. Therefore, under alternatives in which Makah tribal members could hunt during summer (i.e., Alternative 4), there would be a greater potential for a hunt-related boating incident to occur simultaneously with another incident requiring Coast Guard attention.

The potential for incidents requiring a law enforcement response would likely be similar for all hunt-related activities. The risk of hunt-related incidents leading to law enforcement responses that overwhelmed the ability of local law enforcement personnel or facilities to respond would thus depend on the number of days with hunt-related trips. The severity of the effect on public services could vary according to the time of year the hunts occur. If law enforcement is diverted during periods when demand might be higher (such as during the busier summer season), the consequences of the diversion could be greater.

4.14.2.2 Medical Facilities

As noted in Subsection 4.15 (Public Safety), hunt-related activities might result in injuries from boating accidents, mishaps with weapons, violence associated with protests, or possible traffic accidents. A sudden influx of persons requiring medical attention could exceed the physical or technical capacities of tribal and other local public health facilities. Additional trauma care facilities are available nearby. They include a Level 3 trauma care facility in Port Angeles and a Level 1-2 facility in Seattle. During the spring 2000 hunt, one protester sustained a shoulder injury and was transported to Port Angeles for medical care (Subsection 3.15.3.4, Behavior of People Associated with the Hunt).

The potential for injuries requiring medical attention would likely be similar for all hunt-related activities, though hunt-related trips during inclement weather and further from shore might increase the risk of boating accidents for both protesters and hunters (Subsection 4.15.2.2, Injury from Boating Accidents). The risk of injury associated with any given alternative would, therefore, depend on the number of days with hunt-related trips, restrictions on the location of the hunt (i.e., distance from shore), and seasonal restrictions on hunting (that is, the ability of the Tribe to hunt during summer and therefore choose hunting opportunities with better weather conditions).

4.14.3 Evaluation of Alternatives

The following subsections consider the potential for the alternatives to affect public services in the project area. For each alternative, the discussion addresses the anticipated change in the number of incidents requiring law enforcement intervention and injuries requiring medical attention.

The lowest risk of adverse effects on public services would occur under the No-action Alternative because no whale hunts would be permitted and the need for law enforcement and medical attention in the project area would not be expected to differ from current levels. Under all of the action alternatives, protests and other activities associated with whale hunts would have the potential to divert law enforcement resources from other missions. Hunt-related activities could also result in an increase in the number of injuries and exceed the capabilities of local health facilities. The greatest increases in the potential for such occurrences would occur under Alternatives 2, 3, and 6, under which hunt-related trips would occur on approximately 60 days per year. Hunting under these alternatives would be limited, however, to periods when the number of recreational visitors in the project area is comparatively low, reducing the likelihood that hunt-related incidents might occur when public services resources were engaged elsewhere. On the other hand, vessels engaged in hunt-related trips during winter and spring months under these alternatives would face an elevated risk (compared to during the summer months) of encountering unanticipated storms and capsizing, resulting in injuries.

The increased potential for diversion of law enforcement resources or the occurrence of injuries that exceed the capabilities of local health facilities would be less under Alternative 5 than under Alternatives 2, 3, and 6 because hunt-related trips would occur on approximately 22 days (albeit during winter and spring, as under Alternatives 2, 3, and 6). The increased risk would be even less under Alternative 4, under which hunt-related trips would likely occur on only 7 days. In addition, hunt-related trips under Alternative 4 could be conducted during the summer months when the risk of vessels capsizing in unanticipated storms would be reduced compared to the other action alternatives. Summer hunts would, however, occur during a comparatively busy time of year when law enforcement and medical services are more likely to be engaged elsewhere.

4.14.3.1 Alternative 1, No Action

Under the No-action Alternative, no whale hunt would be permitted and no whale hunting or associated activities (e.g., protests or law enforcement) would be expected to occur. The need for law enforcement and medical services in the project area would probably not differ from current levels. There would be no potential for injuries or incidents associated with hunt-related activities to overwhelm personnel and facilities or divert resources away from other duties. As under current scenarios, any persons who sustained injuries unrelated to hunt activities exceeding the physical or technical capacities of local public health facilities could be transported to other facilities in the region.

4.14.3.2 Alternative 2, Tribe's Proposed Action

Whale hunts and related activities under Alternative 2 would result in an increased potential for diversion of law enforcement resources or the occurrence of injuries that exceed the capabilities of local health facilities compared to the No-action Alternative. As discussed in Subsection 4.14.2, Evaluation Criteria, the potential for these effects would depend on the number of days with hunt-related trips, as well as the time of year the hunts occur. As described in Subsection 4.1, Introduction, there would likely be approximately 60 days with hunt-related trips per year under Alternative 2. Hunt-related activities would be limited to the period from December through May, and would be expected to occur primarily during April and May. If a law enforcement task force were implemented, similar to previous hunts, protests or other activities would probably not overwhelm the combined personnel and facilities of county, state, federal, and tribal authorities.

Similarly, Alternative 2 could result in injuries requiring medical assistance during approximately 60 days with hunt-related trips. The increased risk of injuries compared to the No-action Alternative could result in an increased risk of exceeding the capabilities of local health facilities. Whale hunting would be limited to the winter and early spring months, outside the period when most search and rescue cases typically occur but also during a period when weather and sea conditions are more likely to contribute to boating accidents. If hunt-related activities resulted in injuries that exceeded the physical or technical capacities of local public health facilities, persons requiring medical attention could be transported to other facilities in the region.

4.14.3.3 Alternative 3, Offshore Hunt

Alternative 3 would include the same hunting season as Alternative 2 and would, therefore, result in the same increased potential, compared to the No-action Alternative, for diversion of law enforcement resources or the occurrence of injuries that exceed the capabilities of local health facilities. This increased potential would occur on approximately 60 days from December through May (most likely during April and May). As under Alternative 2, if a law enforcement task force were implemented, similar to previous hunts, protests or other activities would probably not overwhelm the combined personnel and facilities of county, state, federal, and tribal authorities.

Hunting would take place farther off shore under Alternative 3 than under the other action alternatives because Makah hunters would be prohibited from making an initial strike on a gray whale within 5 miles (8 km) of shore. This restriction might result in a decreased need for law enforcement response during hunt-related trips compared to the other action alternatives because of the range limitations of some vessels (e.g., jet skis) used by protesters. If fewer people are able to participate near vessels engaged in hunting, there may be fewer situations that result in the issuance of citations for negligent vessel operations, MMPA take violations, or violations of the MEZ.

Alternative 3 could result in injuries requiring medical assistance during approximately 60 days with hunt-related trips, similar to Alternative 2. The increased risk of injuries compared to the No-action Alternative could result in an increased risk of exceeding the capabilities of local health facilities. Whale hunting would be limited to the winter and early spring months, outside the period when most search and rescue cases typically occur but also during a period when weather and sea conditions are more likely to contribute to boating accidents. In addition, hunt-related trips that occur farther off shore would have a greater potential to encounter rough seas, possibly increasing the risk of boating accidents and the need for medical attention compared to the other action alternatives. If hunt-related activities resulted in injuries that exceeded the physical or technical capacities of local public health facilities, persons requiring medical attention could be transported to other facilities in the region.

4.14.3.4 Alternative 4, Summer/Fall Hunt

Under Alternative 4, the hunting season would extend from June 1 through November 30 instead of December through May. Based on the expectation that locating and striking a known ENP male whale would take no more than 7 days (Subsection 4.1.4, Alternative 4), hunt-related trips under Alternative 4 would be likely to occur on approximately 7 days per year. Compared to the No-action Alternative, therefore, Alternative 4 would result in an increased potential for diversion of law enforcement resources or the occurrence of injuries that exceed the capabilities of local health facilities. This increased potential would occur on approximately 7 days per year, which is less than under any of the other action alternatives.

Hunting under Alternative 4 would likely take place during the summer when the need for law enforcement resources is generally higher and the potential for conflict between hunt-related law enforcement needs and other law enforcement needs would be higher. As under Alternatives 2 and 3, however, implementation of a law enforcement task force would minimize the potential for protests or other activities to overwhelm the combined personnel and facilities of county, state, federal, and tribal authorities. In addition, hunt-related trips during summer would be less likely to encounter weather and sea conditions that contribute to boating accidents, reducing the potential for any given trip to result in the need for search and rescue operations or medical attention of injured persons.

4.14.3.5 Alternative 5, Split-season Hunt

Under Alternative 5, the hunting season would be 3 weeks in December and 3 weeks in May, in contrast to the 6-month-long hunting seasons under the other action alternatives. In addition, the landing of a single PCFG whale, or the striking and losing of a single whale, would end the hunt for any given year. Based on the length of the hunting season, Alternative 5 would likely result in approximately 22 days per year with hunt-related trips. This could decrease to 0 days in years in which the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale.

Compared to the No-action Alternative, therefore, Alternative 5 would result in an increased potential for diversion of law enforcement resources or the occurrence of injuries that exceed the capabilities of local health facilities. This increased potential would occur on approximately 22 days per year. Compared to Alternatives 2, 3, and 6, this increased potential would occur on fewer days per year (22 versus 60). Compared to Alternative 4, this increased potential would occur on more days per year (22 versus 7). If a law enforcement task force were implemented, similar to previous hunts, protests or other activities would probably not overwhelm the combined personnel and facilities of county, state, federal, and tribal authorities. The increased risk of injuries compared to the No-action Alternative could result in an increased risk of exceeding the capabilities of local health facilities.

4.14.3.6 Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits

Under Alternative 6, the waiver and implementing regulations would lapse after 10 years and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

Alternative 6 would be expected to result in the same number of days with hunt-related trips (60) as Alternative 2 and would include the same restrictions on hunting area and season. Thus, the increased potential for diversion of law enforcement resources or the occurrence of injuries that exceed the capabilities of local health facilities would be the same as under Alternative 2 compared to the No-action Alternative.

4.15 Public Safety

4.15.1 Introduction

This subsection addresses the potential for a whale hunt and hunt-related activities in the project area to affect public safety. Persons whose safety may be affected by whale-hunt-related activities are divided into three groups: hunters and other participants (such as official observers, members of the media, and law enforcement personnel), protesters, and bystanders. Bystanders on the water may include recreational and other boaters; bystanders on land may include Makah tribal members at protests, tourists, or motorists. Individuals from any of these groups could be injured by weapons, boating accidents, or protests and related activities (such as civil disobedience or law enforcement actions). This subsection examines how the potential for those types of injuries might vary depending on the time of year and location of any hunt and on the frequency of any hunting.

4.15.2 Evaluation Criteria

We used three criteria to determine the potential for effects on public safety under the alternatives, based on the ways in which injury may occur as a result of any proposed gray whale hunt. These include injuries from weapons (harpoon, rifle, or explosive grenade), from boating accidents (including those associated with protest activities on the water), or from land-based protest activities.

With the exception of injuries related to adverse weather or sea conditions, the risk of injury would likely be equal for each hunt attempt. The risk of injury associated with any given alternative would, therefore, depend on the harvest limit, the number of days of hunting, the time of year the hunts occur, and the location of the hunt. Table 4-1 identifies the expected number of days of hunting and hunt-related trips under each alternative. Alternatives under which more hunts would occur would probably result in greater risk of injury to hunters, protesters, and bystanders. Alternatives that limit hunting to the winter and spring period would probably result in different levels of risk of injury than an alternative that allowed hunting during the summer (i.e., Alternative 4), depending upon the group involved and the type of injury considered. The following subsections discuss the risk of each type of injury for each of the groups that may be affected.

4.15.2.1 Injury from Weapons

Under the No-action Alternative, no whale hunting is authorized and no weapons are used in the project area to kill whales. Some level of hunting currently exists (e.g., for deer and elk), but the number of injuries associated with weapons accidents in hunting is unknown. Under any of the action alternatives, hunters and other participants would be at the greatest risk of injury from weapons because they would be handling weapons, while protesters and bystanders would experience a lesser risk. The possibility of any person being struck by a bullet or shoulder-fired explosive projectile would be minimized by proposed safety requirements that would include, among other things, the Coast Guard navigational restrictions (Subsection 3.1.1.3, Coast Guard Regulated Navigation Area), hunter training, visibility requirements, and a lookout to determine when the shooter would have a clear line of fire at a whale (Subsection 2.3.2.2.12, Other Environmental Protection Measures). In addition, the offshore hunt area under Alternative 3 is intended to mitigate the risk of bullets injuring persons on shore (although hunters and other participants would still be at risk as in the other action alternatives).

The risk of injury to any group of individuals from weapons would depend on several factors. One is the number of whales that could be struck and the number of whales that could be harvested, which in turn would affect the number of shots fired or grenades launched. Table 4-1 identifies the number of whales that may be struck and the number of shots fired or grenades launched under each Alternative. The risk of injury would also depend on the season during which hunting occurs. Hunts that take place during the winter and spring months may have a greater potential to result in injury from weapons than hunts that occur during the summer. This is because the limited hunting season would include periods of rougher weather and sea conditions, which might hamper the accuracy of hunters using harpoons, rifles, or explosive projectiles. Less accurate strikes might result in greater risk of injury to hunt participants, protesters, and bystanders. The risk of injury from weapons may also be affected by the location of the hunt. Hunts that take place in waters more than 5 miles (8 km) off shore (as under Alternative 3) would have an elevated potential of encountering rough seas, possibly hampering the accuracy of hunters but also essentially eliminating the risk of stray projectiles striking bystanders on land. While it is unclear what specific .577 ammunition would be available to the Tribe, it would likely have an even smaller maximum range than the .50 caliber proposed by the Tribe given that the .577 is a heavier bullet with a larger diameter and lower estimated muzzle velocity and energy (Ingling 1999).

Hunters and Other Participants

Hunters using a toggle-point harpoon could be cut by the harpoon tip or struck with the shaft. Hunters using either a harpoon or an explosive projectile as the primary weapon for striking the whale could become tangled in the line. Hunters using an explosive projectile either as the primary or secondary hunting weapon (launched either from a darting gun or shoulder gun) could be injured if the grenade exploded prematurely. There would be a greater risk with black powder grenades, where the fuse would be lit before the grenade was fired (Subsection 3.15.3.5.2, Weapons Associated with the Hunt). The fuse on penthrite grenades would not be lit until the projectile entered the whale, reducing the risk of hunter injury from premature detonation (Subsection 3.15.3.5.2, Weapons Associated with the Hunt). Hunters using a rifle as the secondary weapon for killing a whale could potentially be injured from the rifle recoiling or misfiring; hunters could also be struck directly or by ricochet with a .50 caliber bullet.

Weapons also present the potential for injury to other participants, such as members of the media, hunt observers, and enforcement officials. Such individuals could be exposed to many of the same potential injuries from weapons as hunters, but they would be less likely to be injured by a harpoon, premature detonation of grenades, or rifle recoil. Such injuries are more likely to be associated with handling a weapon.

Protesters

Protesters would face a lower risk than hunters of being injured by weapons misfiring, because protesters would not likely be handling weapons. Records of the 1999 and 2000 protests do not show that protesters possessed weapons. Protesters could be struck by an errant harpoon, bullet, or explosive projectile, and protesters who attempt to interfere with a hunt by positioning their vessels between whales and hunters would be more likely to be struck by a projectile. Protesters might also sustain injuries if their vessels were struck by a projectile.

Bystanders

Recreational boaters and other potential bystanders would probably not encounter hunting activities under the action alternatives because of the large size of the hunting area, its remoteness, and the presence of the Coast Guard MEZ. Any recreational boaters who encountered hunting activities would likely avoid them. Because they would probably not be near the hunt, bystanders on the water would most likely not be injured by weapons. It is extremely unlikely that bystanders on land would be exposed to injury from weapons under the action alternatives, because any hunt would probably occur hundreds to thousands of yards (meters) from shore and tribal hunters would adhere to weapon discharge procedures (e.g., visibility and shot distances) expected to constrain the area of potential danger to the immediate vicinity of the whale being pursued (Beattie 2001; Graves et al. 2004; Makah Tribe 2005). There is nevertheless a remote possibility (intended to be extremely remote under Alternative 3) that a bystander on shore could be struck by a .50 caliber bullet, which has a range of up to 5 miles (8 km).

4.15.2.2 Injury from Boating Accidents

Under the No-action Alternative, no whale hunts are authorized and no vessel activity associated with whale hunts would occur. There is a considerable amount of commercial and recreational vessel activity in the area, some of which results in boating accidents and injuries. The Coast Guard responds to approximately 100 search and rescue cases each year (Subsection 3.14.3.1, Coast Guard). The number of injuries associated with these incidents is not known. Under any of the action alternatives, boating accidents might result from protest activities on the water, the actions of a wounded whale, or adverse weather and sea conditions. Any type of boating accident could result in traumatic injury, drowning, or hypothermia. The risk of individuals being injured in a boating accident associated with protester activities would be reduced by the Coast Guard navigational restrictions (Subsection 3.1.1.3, Coast Guard Regulated Navigation Area) to the extent protesters obeyed those restrictions.

The risk of injury to any group of individuals from boating accidents would depend on several factors. One is the number of days with hunt-related trips. Table 4-1 identifies the anticipated number of days with hunt-related trips under each alternative and Subsection 4.1, Introduction, describes the rationale for those numbers. The risk of injury would also depend on the season during which hunting occurs. Hunts that take place during the winter and spring months may have a greater potential to result in injury from boating accidents. This is because the limited hunting season would include periods of rougher weather and sea conditions, which might increase the potential for boating accidents compared to hunts that occur during milder weather and calmer seas. Risk of injury from boating accidents may also depend on the location of the hunt. Generally, the further from shore the hunt occurs, the greater the potential to encounter rough seas; the potential consequences of any resultant injuries could be aggravated by the increased time needed to transport injured persons to medical facilities on shore. Finally, the risk of injury from boating accidents may also depend on the type of vessel used for hunting (motorized versus canoe). For this analysis, accidents caused by the behavior of protesters on the water, the behavior of a wounded whale, or as a result of attempting to tow a whale to shore, are considered as boating accidents.

Hunters and Other Participants

Protesters on small vessels, jet skis, and a small submarine accompanied the 1999 and 2000 hunts (Subsection 3.15.3.4, Behavior of People Associated with the Hunt). Some protesters attempted to interfere with the hunt by placing their vessels between whales and hunting vessels, charging hunting vessels, or harassing whales to make them move away from hunting vessels (Subsection 3.15.3.4, Behavior of People Associated with the Hunt). This type of vessel operation could cause boating accidents involving hunters or other participants. No hunters or other participants were injured as a result of actions of protest vessel operators during the 1999 and 2000 hunts.

An injured whale could also cause a boating accident. A harpooned whale might ram or otherwise strike boats. A harpooned whale might also swamp a canoe or motorized vessel by swimming away or diving (Subsection 3.4.3.5.3, Whale Response to Being Struck), though the risk would be less with a motorized vessel. Also, the secondary weapon (either a .50 caliber rifle as proposed or an explosive projectile launched from a darting gun or shoulder gun) would most likely kill a wounded whale within minutes of a harpoon strike.

A boating accident could also result if boats became unstable, swamped, capsized, or struck other boats, especially during rough weather or high seas conditions. A boat towing a whale to shore could also become unstable because of the size and weight of the whale. This type of risk would be greater under alternatives that restrict hunting to the winter and spring months (i.e., Alternatives 2, 3, 5, or 6), when the potential for encountering adverse weather conditions is greater than during summer. The risk of boating accidents may also increase with the distance of hunting from shore. Generally, the further from shore the hunt occurs, the greater the transit time and the potential to encounter rough seas. The risk of accidents may also be influenced by the type of vessels used for hunting because motorized vessels are assumed to be less susceptible than human-powered canoes to swamping or capsizing.

Protesters

Persons operating vessels engaged in protests may place themselves at risk of injury from boating accidents. For example, in 2000, one jet ski operator entering the MEZ collided with a Coast Guard vessel and sustained a shoulder injury (Subsection 3.15.3.4, Behavior of People Associated with the Hunt).

In addition, protesters may face a risk of boating accidents from the actions of an injured whale or as a result of adverse weather and sea conditions, as described in Hunters and Other Participants. The risk of injury from a wounded whale would probably be lower for protesters than for hunters, as hunters would likely be closer to injured whales. Similarly, the risk of boating accidents as a result of weather and sea conditions would be lower during hunts that take place during the summer months than during winter and spring.

The potential for boating accidents involving protesters could be reduced by restrictions on the location of hunting. Under Alternative 3, which would restrict hunting to areas more than 5 miles (8 km) from shore, it is possible that fewer protesters would be present (and exposed to injury) because they would not have the capacity to travel that far from shore or keep pace with the hunt vessels. On the other hand, protesters who do accompany an offshore hunt would be exposed to greater risk of injury from boating accidents than with nearshore hunts because of the elevated potential for encountering rough seas.

Bystanders

As described above in 4.15.2.1 Injury from Weapons [Bystanders], bystanders on the water probably would not be close enough to the hunting area to be injured in a boating accident related to protest activities or a wounded whale. The potential for recreational boaters to sustain injury because of adverse weather or sea conditions would be independent of the presence or absence of hunt-related activities under any of the alternatives.

4.15.2.3 Injury from Land-based Protest Activities

Under the No-action Alternative, no whale hunts would be authorized and no whale-hunting protests would occur. There are presently no known incidents of other forms of organized civil disobedience in the area. Under the action alternatives, protesters might stage protests on the road leading to the Makah Reservation, on or near the reservation itself, or on the water around the hunt. Potential risks associated with water-based protests are addressed in Subsection 4.15.2.2, Injury from Boating Accidents. During the 1999 and 2000 hunts, demonstrators on the Makah Reservation exchanged insults with tribal members, including hunters (Subsection 3.15.3.4, Behavior of People Associated with the Hunt). The risk of individuals being injured as a result of protest activities on land would be minimized by implementation of an enforcement management plan similar to that applied during previous hunts. The risk of injury to any group of individuals from protest activities would most likely depend on the number of days with hunt-related activities (Table 4-1).

Hunters and Other Participants

Protest activities on land might expose hunters and other participants (including law enforcement personnel) to risk of injury. No hunters or other participants were injured during the 1999 and 2000 hunts because of protests on land.

Protesters

Protesters might face a risk of injury from the actions of law enforcement personnel, protesters, or counter-protesters. In one incident during the 1998 practice whale hunt exercise, a protester was pushed from a dock but did not sustain injury. There was also an instance of Makah youth throwing rocks at protester vessels, causing no injury, but damaging a vessel windshield (Subsection 3.15.3.4, Behavior of People Associated with the Hunt). No protesters were seriously injured during the 1999 and 2000 hunts because of protests on land.

Bystanders

For this analysis, Makah tribal members and non-members who are not actively engaged as hunt participants are considered bystanders, along with persons who are not engaged in protests. During the 1999 and 2000 protests, some tribal members not involved in the hunt engaged protesters, and there were some altercations, although no one was seriously injured (Subsection 3.15.3.4, Behavior of People Associated with the Hunt). Bystanders might approach protest scenes as onlookers, or could be drawn into protests, with an attendant risk of personal injury.

4.15.3 Evaluation of Alternatives

The following subsections consider the potential for the alternatives to affect the safety of hunters and other participants, protesters, and bystanders. For each alternative, the discussion addresses the anticipated change in the number of injuries resulting from weapons, boating accidents, or protest activities.

The lowest risk of adverse effects to public safety would occur under the No-action Alternative because no hunting would occur and there would be no associated protest activities. Alternative 2, which would include the highest maximum number of gray whales that could harvested and would be expected to result in the greatest number of days with hunt-related trips, would result in the greatest increased risk to public safety from weapons, boating accidents, and protest activities compared to the No-action Alternative. Alternatives 3 and 6 would be expected to result in similar numbers of days with hunt-related trips as Alternative 2 (and during the same times of year), but would impose stricter limits on the number of ENP whales harvested and on the mortality of PCFG whales. As a result, Alternatives 3 and 6 would be expected to have a lower risk of weapons-related injuries, compared to Alternative 2, and a similar risk of injuries as a result of boating accidents or protest activities. Of the action alternatives, Alternative 3 would also have the lowest risk of weapons-related injuries to bystanders on shore because hunting would occur beyond the range of a .50 caliber rifle. The potential for boating accidents under Alternative 3 could be higher than under Alternatives 2 and 6 because hunts would take place farther off shore where there would be a greater risk of encountering rough seas.

Under Alternative 5, hunt-related trips would be expected to occur on fewer days than under Alternatives 2, 3, and 6 (22 versus 60), reducing the potential for injuries as a result of boating accidents or protest activities. Stricter limits on the number of ENP whales harvested and on the mortality of PCFG whales would reduce the number of whales that could be struck and harvested, reducing the potential for weapons-related injuries compared to Alternatives 2, 3, and 6. Lastly, Alternative 4 would include the strictest limits among the action alternatives on the number of whales harvested (1) and would allow hunting during the summer months when the risk of encountering adverse weather and seas would be lowest. Compared to the other action alternatives, therefore, Alternative 4 would result in the smallest increase, relative to the No-action Alternative, in the risk to public safety from weapons, boating accidents, and protest activities.

4.15.3.1 Alternative 1, No Action

Currently, no whale hunting occurs in the project area, so there are no accidents related to whale hunting. Recreational boaters, commercial and recreational fishers, and commercial vessels currently use the project area (Subsection 3.13.3.2, Marine Vessel Traffic) and there is likely currently some level of injury associated with boating, although the amount is unknown. Hunting also currently occurs in the project area (e.g., for deer and elk) and there is likely some level of injury from weapons associated with hunting, although the amount is unknown. Under the No-action Alternative, there would be no increased risk of injury to individuals beyond those levels that occur under current conditions.

4.15.3.2 Alternative 2, Tribe's Proposed Action

Under Alternative 2, hunt-related trips would likely occur on approximately 60 days from December through May each year, primarily during April and May. Compared to the No-action Alternative (under which there would be no whale-hunt-related injuries), there would be an increased risk of injury from weapons, boating accidents, and protest activities in the project area on each day that hunting occurred. Based on the gray whale harvest limit and restrictions on the mortality of PCFG whales, Alternative 2 would be expected to result in 7 strikes and up to 42 unsuccessful harpoon attempts each year (Table 4-4), plus 64 rifle shots and 12 grenade explosions (Table 4-1). With each strike attempt, rifle shot, or grenade explosion there would be an increased risk, compared to the No-action Alternative, of weapons-related injury to hunt participants, protesters, or bystanders.

Hunt-related trips under Alternative 2 would occur only during winter and spring. As a result, the potential for injuries from weapons or boating accidents would be elevated compared to hunts that occur during summer when milder weather and calmer seas are more common.

4.15.3.3 Alternative 3, Offshore Hunt

As under Alternative 2, hunt-related trips under Alternative 3 would likely occur on approximately 60 days from December through May each year, primarily during April and May. Compared to the No-action Alternative, Alternative 3 would thus be expected to result in the same increase as Alternative 2 in the number of days with an elevated risk of injury from boating accidents and protest activities. Because tribal hunters would be prohibited from making an initial strike on a gray whale within 5 miles (8 km) of shore, most hunt activities would likely take place more than 5 miles (8 km) off shore. This would increase the potential for hunt participants and protestors to encounter rough seas, possibly increasing the potential for boating-related accidents. As discussed in Subsection 4.1.3.2, Potential Number and Type of Vessels, it is assumed for this analysis that whale hunting under Alternative 3 would be conducted from motorized vessels rather than canoes. Because motorized vessels would likely be less susceptible than human-powered canoes to swamping or capsizing, the risk of injury to hunting party participants from boating accidents as a result of rough seas could be offset to an unknown extent by the reduced risk of swamping or capsizing. In addition, the greater distance from shore could limit the number of protest vessels that pursue the hunting party, potentially reducing the number of protesters and law enforcement personnel who are exposed to an elevated risk of boating accidents.

Alternative 3 would include the same limits on the number of whales harvested as Alternative 2, but would impose additional restrictions on the mortality of PCFG whales. Based on the gray whale harvest limit and restrictions on the mortality of PCFG whales, Alternative 3 would be expected to result in 6 strikes and up to 36 unsuccessful harpoon attempts each year (Table 4-6), plus 64 rifle shots and 12 grenade explosions (Table 4-1). With each strike attempt, rifle shot, or grenade explosion, there would be an increased risk, compared to the No-action Alternative, of weapons-related injury to hunt participants, protesters, or bystanders. Because hunts would take place in waters more than 5 miles (8 km) off shore, hunters would have an elevated potential of encountering rough seas while operating weapons, as compared to Alternative 2, possibly increasing the risk of weapons-related injuries. The potential for stray projectiles to strike bystanders on land would be eliminated, however, because the maximum range of the longest-range weapon (a .50 caliber rifle) is less than 5 miles (8 km) (Subsection 3.4.3.5.4, Method of Killing and Time to Death). As with the risk of boating accidents, the greater distance from shore could limit the number of protest vessels that pursue the hunting party, potentially reducing the number of protesters and law enforcement personnel who are exposed to an elevated risk of weapons-related injuries.

4.15.3.4 Alternative 4, Summer/Fall Hunt

Under Alternative 4, the hunting season would extend from June 1 through November 30 instead of December through May. Based on the expectation that locating and striking a known ENP male would take no more than 7 days (Subsection 4.1.4, Alternative 4), hunt-related trips under Alternative 4 would be likely to occur on approximately 7 days per year. Compared to the No-action Alternative, therefore, Alternative 4 would result in an increased risk to public safety from weapons, boating accidents, and protest activities. This increased risk would occur on fewer days, however, than under any of the other action alternatives (7 versus 22 to 60).

Hunting under Alternative 4 would likely take place during the summer, when the risk of encountering adverse weather conditions or rough seas would be lower than during winter or spring. Compared to the other action alternatives, the ability to hunt during summer under Alternative 4 could reduce the potential associated with each hunt for injury from weapons and boating accidents because of unfavorable weather and sea conditions. Hunting under Alternative 4 may also target whales that are feeding relatively close to shore (compared to whales that are migrating farther off shore at other times of year). If hunting under Alternative 4 occurred closer to shore, there would be an increased risk of injury, per rifle shot, to bystanders on shore compared to the other action alternatives. Based on the gray whale harvest limit and restrictions on the mortality of PCFG whales, Alternative 4 would be expected to result in 1 strike and up to 6 unsuccessful harpoon attempts each year (Table 4-8), plus up to 16 rifle shots or 3 grenade explosions (Table 4-1). With each strike attempt, rifle shot, or grenade explosion, there would be an increased risk, compared to the No-action Alternative, of weapons-related injury to hunt participants, protesters, or bystanders. The increased risk associated with strike attempts would be less than under any of the other action alternatives. The increased risks associated with rifle shots or grenade explosions would be the same as Alternative 5.

4.15.3.5 Alternative 5, Split-season Hunt

Under Alternative 5, the hunting season would be limited to 3 weeks in December and 3 weeks in May, in contrast to the 6-month-long hunting seasons under the other action alternatives. In addition, the landing of a single PCFG whale, or the striking and losing of a single whale, would end the hunt for any given year. Based on the length of the hunting season, Alternative 5 would likely result in approximately 22 days per year with hunt-related trips. This could decrease to 0 days in years in which the hunt is on hiatus to allow the PCFG mortality limit to re-set at one whale. Compared to the No-action Alternative, therefore, Alternative 5 would result in an increased risk to public safety from weapons, boating accidents, and protest activities on approximately 22 days per year—fewer days than under Alternatives 2, 3, and 6 (60 days) but more than under Alternative 4 (7 days).

Based on the gray whale harvest limit and restrictions on the mortality of PCFG whales, Alternative 5 would be expected to result in as many as 5 strikes (likely fewer) and up to 30 unsuccessful harpoon attempts each year (Table 4-10), plus up to 16 rifle shots or 3 grenade explosions (Table 4-1). With each strike attempt, rifle shot, or grenade explosion, there would be an increased risk, compared to the No-action Alternative, of weapons-related injury to hunt participants, protesters, or bystanders. Risks from strike attempts would be less than under Alternatives 2 and 3, but greater than under Alternatives 4 and 6. Risks from rifle shots or grenade explosions would be less than under Alternatives 2, 3, and 6. Although Alternative 5 would result in the same number of rifle shots or grenade explosions as Alternative 4, the risks under Alternative 5 would be less than Alternative 4 because a hunt under Alternative 4 may occur closer to shore.

4.15.3.6 Alternative 6, Different Limits on Strikes and PCGF, and Limited Duration of Regulations and Permits

Under Alternative 6, the waiver and implementing regulations would lapse after 10 years and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

Alternative 6 would be expected to result in the same number of days with hunt-related trips as Alternative 2 and would include the same restrictions on hunting area and season. Compared to the No-action Alternative, Alternative 6 would thus be expected to result in the same increase as Alternative 2 in the number of days with an elevated risk of injury from boating accidents and protest activities.

Based on the gray whale harvest limit and restrictions on the mortality of PCFG whales, Alternative 6 would be expected to result in an average of 3.5 strikes and up to 21 unsuccessful harpoon attempts each year (Table 4-12), plus up to 56 rifle shots or 11 grenade explosions (Table 4-1). With each strike attempt, rifle shot, or grenade explosion, there would be an increased risk, compared to the No-action Alternative, of weapons-related injury to hunt participants, protesters, or bystanders. Based on the anticipated number of strike attempts, this increase would be less than under Alternatives 2, 3, and 5, but greater than under Alternative 4. Based on the anticipated number of rifle shots or grenade explosions, this increase would be less than under Alternatives 2 and 3 and greater than under Alternatives 4 and 5 (with the caveat that while there would be fewer rifle shots under Alternative 4, each shot could have a greater likelihood of injuring a bystander on shore).

4.16 Human Health

4.16.1 Introduction

This subsection addresses the potential for the alternatives to affect human health of the Makah Tribe in the project area. Three issues pertain to human health and whale hunt-related activities: 1) the potential nutritional benefits associated with consuming whale food products, 2) the potential for exposure to contaminants in food items from whale harvests, and 3) the potential for exposure to food-borne pathogens in food items from whale harvests. Based on the information available for this analysis, all of the alternatives would have a reasonably foreseeable potential to affect human health both positively and negatively. There are too many uncertainties, however, to quantify either type of effect or to predict whether any of the alternatives would result in a net positive or negative effect on human health. We therefore analyze these points in greater detail for Alternatives 2 through 6 together in the following subsections.

4.16.2 Evaluation Criteria

Three criteria were used to determine the potential for effects on human health. The first is the change in nutritional benefits the Makah Tribe could experience under any of the alternatives. The second is the amount of environmental contamination tribal members might be exposed to as a result of consuming gray whale products. The last is the extent to which Makah tribal members would be exposed to food-borne pathogens as a result of processing and consuming whale products.

4.16.2.1 Nutritional Benefits

As described in Subsection 3.16.3.1, Nutritional and Health Benefits from Consuming Whale Food Products and Other Traditional Subsistence Foods, marine mammal tissues historically were an important nutritional component of the Makah diet (Renker 2012). Marine mammal tissues, including large whales, contain vitamins, essential elements, and both essential and beneficial polyunsaturated fatty acids (United States Department of Agriculture 2011). While many of these nutrients are present in other foods (e.g., fish, shellfish, nuts, and vegetable oils), some (e.g., polyunsaturated fats) are present in higher concentrations in marine mammal food products. Documented benefits of consuming essential fatty acids present in whale and fish food products include prevention or alleviation of symptoms associated with diabetes, kidney disease, heart disease, hypertension, and other similar health problems (Budowski 1988; Simopoulos 1999; Simopoulos 2002; Holub and Holub 2004; Ebbesson 2005b; Ebbesson 2005c; Reynolds et al. 2006). In addition, whale products provide a good source of antioxidants (vitamin E) and selenium, which play a role in protecting against some contaminants (e.g., mercury) (Arnold and Middaugh 2004). Whale-derived food products are a source of minerals and vitamins that have well-documented nutritional benefits to populations consuming them.

There are no specific studies that compare the types and concentrations of nutrients in food products obtained from the drift whales occasionally consumed by the Makah with those found in the fresh gray whale food products that would be available to them under Alternatives 2 through 6. Whether consuming freshly harvested gray whale food products would affect the level of nutrition available to Makah tribal members would depend largely on the types and levels of nutrition present in an individual tribal member's existing diet relative to several factors: 1) what part(s) of the whale and how much of each would be consumed, 2) what currently consumed food items (and associated nutritional levels) would be replaced by gray whale food products, and 3) how each food item would be collected, stored, and prepared for consumption. None of this information is currently available or could reasonably be obtained.

4.16.2.2 Environmental Contaminants

As described in Subsection 3.16.3.2, Environmental Contaminants in Gray Whales, gray whale tissues contain chemical contaminants that Makah tribal members would be exposed to if they consumed fresh gray whale food products generated from a successful hunt. Similar contaminants are present in the foods that Makah tribal members typically consume, including fish and shellfish from the project area as well as store-purchased food products. There are no data to compare the amount of contaminants currently being consumed by the Makah Tribe with the amount of contaminants found in fresh whale products, making it difficult to determine the net change in contaminants to which tribal members would be exposed. Also, data do not exist to indicate the amount of fresh whale food products an individual Makah member may consume in lieu of other food sources normally consumed by the same individual. As a result of this lack of data, it is not possible to discern precise risk levels based upon the existing best available information addressing the rate of consumption and method of cooking fresh whale tissues by Makah tribal members. However, it is reasonable to conclude that whale products—in particular blubber—would likely contain higher levels of certain contaminants (e.g., PCBs) than other foods consumed by Makah (and may exceed levels that trigger human health concerns as described in guidelines published by state and federal agencies) Subsection 3.16.3.2, Environmental Contaminants in Gray Whales). For example, PCB concentrations in Chinook salmon from the Makah National Fish Hatchery (19 µg/kg) (Missildine et al. 2005) are considerably lower than those found in samples of gray whale blubber (137 to 1,200 µg/kg) (Table 3-47).

There are no specific studies that compare the types and concentrations of contaminants in food products obtained from the drift whales occasionally consumed by the Makah with those found in the fresh gray whale food products that would be available to them under Alternatives 2 through 6. High contaminant loads are just one of many causes of death for drift whales, yet even whales that appear to be healthy (e.g., the whale killed by the Makah Tribe in 1999) can have contaminant levels higher than those found in stranded animals (Subsection 3.16.3.2, Environmental Contaminants in Gray Whales). Whether consuming freshly harvested gray whale food products would affect contaminant exposure in Makah tribal members would depend largely on the types and levels of contaminants present in an individual tribal member's existing diet relative to several factors: 1) what part(s) of the whale and how much of each would be consumed, 2) what currently consumed food items (and associated contaminants) would be replaced by gray whale food products, 3) the age and sex of the whale, 4) possibly the time of year and body condition of the whale, and 5) how each food item would be collected, stored, and prepared for consumption. None of this information is currently available or could reasonably be obtained.

4.16.2.3 Exposure to Food-Borne Pathogens

As described in Subsection 3.16.3.3, Exposure to Food-Borne Pathogens, exposure to food-borne pathogens might result from improperly handled food items. While exposure to pathogens associated with the consumption of whale products has been documented, it is not unique to consumption of whale food products. Pathogenic organisms (e.g., bacteria, viruses, and parasites) are common in other subsistence and store-purchased foods such as seafood, poultry products, meat products, dairy products, and vegetables. Any of these products could cause illness if they were improperly butchered, stored, or prepared. Thus, under the No-action Alternative, there is some degree of risk to Makah tribal members of contracting food-borne illness from exposure to pathogens. Changes in the quantity of freshly harvested whale consumed would probably not appreciably change the potential for food-borne illness to occur in Makah tribal members, assuming they followed the same general food storage and preparation practices for whale products as for other food products.

4.16.3 Evaluation of Alternatives

The following subsections consider the potential for the alternatives to affect human health using the evaluation criteria described above.

4.16.3.1 Alternative 1, No Action

Under the No-action Alternative, no Makah gray whale hunt would be permitted. Thus, Makah tribal members would not have access to or consume freshly harvested whale products. Under this alternative, no change in the exposure to contaminants or food-borne pathogens or the nutritional composition of the diet from foods consumed by the Makah Tribe would be expected. The continued absence of freshly harvested gray whale food products from the diet of the Makah would continue to preclude tribal members from realizing the added nutritional benefits (e.g., minerals and omega-3 fatty acids) associated with consuming them, but there are no data to suggest that current diets of individual Makah members sufficiently lack these nutritional benefits. For example, the omega-3 fatty acid benefits of whale products (e.g., prevention of heart disease and glucose intolerance) may be adequately realized by tribal members from other food sources. Overall, there is insufficient information to conclude that the lack of fresh whale products under the No-action Alternative would be expected to negatively alter current dietary conditions for any tribal member.

4.16.3.2 Alternatives 2, 3, 4, 5, and 6

Unlike conditions under the No-action Alternative, Alternatives 2, 3, 4, 5, and 6 would allow the Makah Tribe to conduct gray whale hunts in the project area, and it is assumed that consumption of freshly harvested gray whale food products would occur. In household surveys conducted in 2001, 2006, and 2011, 80 to 90 percent of survey respondents expressed an interest in increased access to whale products (Subsection 3.10.3.5.1, Makah Whaling). Consumption could increase exposure to contaminants or food-borne pathogens and would depend in part on the number of whales likely to be harvested per year. This number would be greatest under Alternatives 2 and 3 (up to four whales), followed by Alternative 6 (up to 3.5 whales, on average), then Alternatives 4 and 5 (zero to one whale). Whale products (meat, blubber, and other whale parts) consumed from the whale killed in 1999 amounted to approximately 2.4 pounds per person, but much of the whale was consumed at a community potlatch. The Tribe's most recent needs statement (Renker 2012) estimates that harvesting an average of four gray whales per year would yield 8 to 20 pounds (4 to 9 kg) of meat per capita and 16 to 20 pounds (7 to 9 kg) of oil or blubber per capita (and a somewhat smaller amount of whale oil after rendering). Given these estimates, it is possible for a Makah tribal member to ingest up to 24 to 40 pounds (11 to 18 kg) of whale product per year under Alternatives 2 and 3. As described in Subsection 4.16.2, Evaluation Criteria, it is impossible to predict the precise changes in exposure to contaminants or food-borne pathogens or the nutritional composition of the Makah diet if they have the opportunity to consume freshly harvested whale products. However, it is reasonable to conclude that whale products—in particular blubber—would likely contain higher levels of certain contaminants (e.g., PCBs) than other foods consumed by Makah, such as Chinook salmon (Missildine et al. 2005).

Consumption of freshly harvested gray whale food products may temporarily increase the overall nutritional value of the Makah diet by raising the proportion of certain minerals and omega-3 fatty acids if diets currently lack this benefit. Omega-3 fatty acids have been shown to positively affect glucose tolerance and insulin sensitivity in Alaska Natives (Ebbesson et al. 2005b; Ebbesson et al. 2005c). This relative nutritional increase would occur only as long as whale products were available for consumption. The extent of the nutritional increase would depend in part on the number of whales likely to be harvested per year. This number would be greatest under Alternatives 2 and 3 (up to four whales), followed by Alternative 6 (up to 3.5 whales, on average), then Alternatives 4 and 5 (zero to one whale).

Also, under Alternative 6, the waiver and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

4.17 Regulatory Environment Governing Harvest of Marine Mammals

4.17.1 Introduction

This subsection evaluates the potential for the six alternatives to affect the future regulatory environment governing marine mammals in the United States (including whales) and whales worldwide. Any change in the regulatory environment may ultimately affect the harvest of marine mammals nationally and whales worldwide.

4.17.2 Evaluation Criteria

We used three criteria to determine the potential for the alternatives to affect the regulatory environment governing the harvest of marine mammals. The first is the potential change in requests for waiver of the MMPA take moratorium to allow harvest in the United States of marine mammals other than whales. The second is the potential change in requests for regulatory action to authorize harvest of whales in the United States, which would require application to the IWC for a catch limit, waiver of the MMPA take moratorium (with associated MMPA regulatory actions following NEPA review), and completion of a cooperative agreement under the Whaling Convention Act (WCA). The third is the potential change in IWC regulation of commercial, scientific, or aboriginal subsistence whaling.

Under the No-action Alternative, we would deny the Makah Tribe’s request to hunt whales, and under Alternatives 2 through 6, we would authorize some level of whaling. The analysis in this subsection considers the potential precedential effect of authorizing a hunt—the possibility that authorizing a Makah gray whale hunt may lead to future regulatory changes that would in turn lead to increased hunts of whales or other marine mammals. Because such a precedent could result from any authorization of Makah whaling, even one whale per year, we anticipate that any authorization under the action alternatives (2 through 6) would have the same precedential effect. We therefore analyze Alternatives 2 through 6 together.

4.17.2.1 National Regulation of Marine Mammal Harvest

Section 101(a)(3)(A) of the MMPA directs the Secretary to determine whether and by what means it is compatible with the Act to waive the moratorium and allow taking of any marine mammal. In the history of the MMPA there have been few requests to the Secretary of the Interior or the Secretary of Commerce to waive the MMPA take moratorium (Subsection 3.17.3.1, Waivers of the MMPA Take Moratorium). Currently, there are no active requests for waiver of the MMPA take moratorium aside from the Makah Tribe's request to hunt gray whales.

Under any of the action alternatives, we would waive the take moratorium, adopt regulations, and issue permits under the MMPA. This authorization and a subsequent hunt could lead other parties to seek similar authorizations to harvest marine mammals other than whales. Some Northwest Indian tribes traditionally harvested and used products from seals, sea otters, and other marine mammals. Northwest Indian tribes have, in the past, expressed an interest in harvesting marine mammals (Schmitten 1994). Authorization of a Makah gray whale hunt could revive the interest of the Makah or other tribes in hunting marine mammals. It could also lead to interest by non-Indians in sport or commercial hunting of marine mammals. Such interest could lead to additional requests for MMPA waivers from Indian tribes or non-Indians, and ultimately to the federally authorized harvest of additional marine mammals.

4.17.2.2 National Regulation of Whaling

Section 102(f) of the MMPA prohibits commercial whaling in U.S. waters. Subsection 916c(a) of the WCA prohibits whaling except in accordance with IWC regulations. Thus, under current law, only aboriginal subsistence whaling authorized by the IWC is permitted in U.S. waters. Other Indian tribes historically hunted whales (Subsection 3.4.3.6.1, Aboriginal Subsistence Whaling), and the authorization of a Makah whale hunt under the action alternatives could lead them to request a similar authorization. There are no active requests for national authorization of whale hunts under the WCA except from the Makah Tribe and Alaska Eskimo Whaling Commission (Alexander 2013).

4.17.2.3 International Regulation of Whaling

Public comments on our 2008 Draft Environmental Impact Statement (DEIS) expressed concern that NMFS' approval of Makah whaling could lead to increased whaling worldwide by creating a new category of cultural whaling, thus weakening United States leadership in whale conservation or strengthening the position or resolve of whaling proponents. This analysis addresses the potential for the alternatives to change the IWC regulatory environment with respect to commercial and scientific whaling and with respect to aboriginal subsistence whaling. Changes in these types of whaling might occur because of changes in the United States' position or persuasive authority, changes in other countries' willingness to pursue whaling in response to U.S. actions, or changes in the interpretation of what constitutes aboriginal subsistence whaling.

4.17.3 Evaluation of Alternatives

For each alternative, the discussion first addresses the anticipated change in the number of requests for waivers of the MMPA take prohibition for marine mammals other than whales, and potential change in the number of marine mammals killed in the United States as a result. Historically, there have been few requests to waive the MMPA take moratorium, suggesting there would be few in the future under current conditions. Under the No-action Alternative, such requests would be even less likely, as both Indian and non-Indian parties would be discouraged by the time and effort required to seek a waiver and by the negative results of the Makah request. Conversely, under Alternatives 2 through 6, we would authorize a Makah gray whale hunt, and that authorization would make it more likely for parties to seek an MMPA waiver compared to the No-action Alternative.

For each alternative, the analysis next considers potential changes in the number of requests for aboriginal subsistence whale hunt authorizations and the number of whales killed in the United States as a result. There have been no requests for whale hunts historically, except by the Alaska Eskimo Whaling Commission and the Makah Tribe. The No-action Alternative would make it less likely that Indian tribes would seek authorization in the future compared to current conditions, while any of the action alternatives would make it more likely, compared to the No-action Alternative. Whether such requests would result in a change in national regulations governing harvest of marine mammals is speculative because it would depend on variables associated with the specific request that are currently unknown.

Finally, for each alternative the analysis considers potential changes in IWC regulations governing any type of whaling and the number of whales killed worldwide as a result. Changes could come about because of changes in the U.S. position at the IWC, changes in U.S. persuasive authority, or changes in the actions of other countries in response to U.S. action under one of the alternatives. It is speculative to predict how any of the alternatives would influence the regulatory landscape, given the legislative process of the IWC and the competing views and interests of the IWC parties. It is possible that denial of the Makah Tribe's request under the No-action Alternative would dampen efforts to set catch limits for whaling of any type, particularly aboriginal subsistence whaling. It is conversely possible that the approval of harvesting even a single whale per year under the action alternatives would encourage efforts to set catch limits for additional whaling, particularly aboriginal subsistence whaling.

4.17.3.1 Alternative 1, No Action

Under the No-action Alternative, we would not authorize a gray whale hunt by the Makah Tribe.

4.17.3.1.1 National Regulation of Marine Mammal Harvests

As described in Subsection 3.17.3.1, Waivers of the MMPA Take Moratorium, there have been very few requests for waiver of the take moratorium, and none since 1987 except the Makah Tribe's request. We would therefore predict very few requests in the future under current conditions. Denial of the Makah Tribe's request under the No-action Alternative would make it even less likely there would be future requests for a waiver, as both Indian and non-Indian parties would be discouraged by the time and effort required to seek a waiver and by the negative results of the Makah request. Because of the negligible chance of future requests or authorizations under current conditions, the No-action Alternative would not measurably change the likelihood of future requests or the number of marine mammals killed in the United States as a result of such requests.

4.17.3.1.2 National Regulation of Whaling

Except for the Alaska Eskimo Whaling Commission and the Makah Tribe, there are no other groups in the United States that have requested authorization to pursue an aboriginal subsistence whale hunt. We would therefore predict very few requests in the future under current conditions. Denial of the Makah Tribe's request under the No-action Alternative would make it even less likely there would be future requests for authorization of aboriginal subsistence whaling, as any Indian tribes with a potential claim to aboriginal subsistence status would be discouraged by the time and effort required to seek a waiver and by the negative results of the Makah request. Because of the negligible chance of future requests or authorizations under current conditions, the No-action Alternative would not measurably change the number of whales killed in the United States by aboriginal subsistence whale hunters.

4.17.3.1.3 International Regulation of Whaling

Commercial and Scientific Whaling

Subsection 3.17.3.2.2, Commercial and Scientific Whaling, describes the current conditions regarding international regulation of commercial and scientific whaling. It is unlikely that denial of the Makah Tribe's request under the No-action Alternative would change the international regulatory environment for either type of whaling. The United States has consistently supported the ban on commercial whaling since 1972, and opposed the increases in scientific whaling. This position did not change with the U.S. request for a catch limit on behalf of the Alaska Eskimo Whaling Commission or the Makah Tribe, and there is no reason to expect it would change if we adopted the No-action Alternative and denied the Makah Tribe's request.

Similarly, there is no reason to expect that denial of the Makah Tribe's request would alter the persuasive authority of the United States or the actions of other countries in the IWC regarding commercial and scientific whaling. As described in Subsection 3.17.3.2.2, Commercial and Scientific Whaling, the debate over commercial whaling has dominated IWC interactions for many years, and increased scientific whaling by Japan appears to be a tool to gain leverage in that debate. Even if the Makah Tribe's request to hunt gray whales were denied under the No-action Alternative, the United States would likely still pursue aboriginal subsistence catch limits for the Alaska Eskimo Whaling Commission and support the requests of other countries for aboriginal subsistence catch limits. Thus, under the No-action Alternative, pro-whaling countries could still argue that the United States' actions on aboriginal subsistence whaling were inconsistent with its opposition to commercial and scientific whaling.

Aboriginal Subsistence Whaling

Denial of the Tribe's request under the No-action Alternative has the greatest potential to affect aboriginal subsistence whaling because that is the regulatory provision under which the IWC has set a catch limit for gray whales, which is shared by the Chukotkan natives in Russia and the Makah Tribe in the United States. The IWC first set a catch limit on behalf of the Makah Tribe in 1998. We authorized a Makah whale hunt in 1999 and 2000 and have not authorized a hunt since 2000 because of litigation and administrative processes. There is no evidence to suggest that the current administrative process related to the Tribe's request (or the lack of authorization during that process) has changed any of the dynamics in the IWC or had an effect on the regulatory environment for aboriginal subsistence whaling within the IWC. We therefore consider it unlikely that denial of the Tribe's request under the No-action Alternative would have an effect on the regulation of aboriginal subsistence whaling that would represent a change from the current condition.

4.17.3.2 Alternatives 2, 3, 4, 5, and 6

Under Alternatives 2 through 6, we would authorize a gray whale hunt through waiver of the MMPA take moratorium, issuance of regulations and permits, and completion of processes under the WCA. Also, under Alternative 6, the waiver and implementing regulations would lapse after 10 years, and it is not possible to predict whether they would be replaced with a new waiver and implementing regulations or what the terms of any new waiver and regulations would be. Therefore, the analysis for Alternative 6 considers effects only over a 10-year period.

4.17.3.2.1 National Regulation of Marine Mammal Harvests

In contrast to the No-action Alternative, under which a denial of the Tribe's request would discourage future requests for marine mammal harvests, authorization of the Makah Tribe's request under

Alternatives 2 through 6 could encourage applicants (including the Makah Tribe) to consider seeking a waiver of the MMPA take moratorium to allow subsistence, commercial, or sport harvest of gray whales or other marine mammals. Thus, there would be an increased likelihood of future requests. We consider the increased likelihood to be small. First, as described in Subsection 3.17.3.1, Waivers of the MMPA Take Moratorium, there have been very few requests for waiver of the take moratorium, and none since 1987 except the Makah Tribe's request. This is likely the result of the complexity of the waiver process, the length of time required to complete the process, and the lack of resulting harvest opportunities. These factors would continue to limit interest in seeking MMPA waivers, even if a Makah whale hunt were authorized under one of the action alternatives. The most likely increase in waiver applications would come from other treaty tribes, who might view the approval of the Makah's application as a precedent for approval of additional waiver applications to take marine mammals that they had harvested traditionally and that remained important to them for cultural or other reasons. If authorization of a hunt under one of the action alternatives (Alternatives 2 through 6) did lead to additional waiver requests, the outcome of any process to consider them would depend on a number of facts specific to the requests that are not presently known, making it speculative to conclude that the harvest of marine mammals nationally would change as a result of implementing Alternatives 2 through 6. Any additional waiver requests for marine mammals other than whales would be subject to analyses under NEPA as well as the MMPA.

4.17.3.2.2 National Regulation of Whaling

Aside from Indian tribes and Alaska Natives, we are not aware of entities in the United States that could claim aboriginal status to pursue whaling under the WCA. Alaska Natives have received WCA allocations for bowhead whales since 1978. The Makah Tribe formally expressed interest in resuming a gray whale hunt starting in 1995 (Makah Tribal Council 1995). We first published a WCA quota for the Tribe's use in 1998 (63 Fed. Reg. 16701, April 6, 1998). The 1998 to 2002 gray whale catch limit in the Schedule was in response to a joint U.S.-Russian Federation request on behalf of the Makah Tribe and Chukotka Natives (Subsection 1.2.4.1.3, IWC Aboriginal Subsistence Whaling). Although it has been over 35 years since Alaska Natives first received a WCA allocation and over 15 years since the Makah Tribe received its allocation, no other Indian tribe or Alaska native group has requested an allocation or inquired about receiving an allocation for whales under the WCA. This history suggests that beyond the Makah and the Alaska Eskimo Whaling Commission there is little interest by other native groups to seek authorization to harvest whales. In addition, the complexity of the process and length of time required to complete it would probably limit the interest of most potential applicants. It therefore seems unlikely that implementation of Alternatives 2 through 6 would lead other Indian tribes to seek authorization to hunt whales.

Nevertheless, tribes other than the Makah traditionally hunted gray whales (Subsection 3.4.3.6.1, Aboriginal Subsistence Whaling), and authorization of a Makah gray whale hunt could encourage them to seek a similar authorization. If authorization of a hunt under Alternatives 2 through 6 did lead to additional requests to hunt gray whales, the outcome of any process would depend on a number of facts specific to those requests that are not presently known, making it speculative to conclude that the harvest of gray whales nationally would change as a result of implementing Alternatives 2 through 6.

Authorization of the Makah Tribe's request under Alternatives 2 through 6 could also lead the Makah Tribe or other tribes to request additional authorization to hunt other species of whale besides gray whales. Comments on our 2008 DEIS noted past interest by the Makah Tribe in hunting humpback whales, and tribes other than the Makah traditionally hunted humpback whales (Subsection 3.4.3.6.1, Aboriginal Subsistence Whaling). Humpback whales are currently listed under the ESA and therefore a waiver of the MMPA take moratorium is not possible, but NMFS is currently evaluating a petition to delist North Pacific humpback whales (78 Fed. Reg. 53391, August 29, 2013). Any future request to hunt gray whales, or humpback whales if they were delisted, would need to be authorized by the IWC and go through NEPA, MMPA, and WCA processes. The complexity of the process and length of time required to complete it would probably limit the interest of most potential applicants, including the Makah Tribe. If authorization of a hunt under Alternatives 2 through 6 did lead to an additional waiver request by the Makah Tribe or other tribes, the outcome of any process would depend on a number of facts specific to those requests that are not presently known, making it speculative to conclude that the harvest of whales nationally would change as a result of implementing Alternatives 2 through 6.

4.17.3.2.3 International Regulation of Whaling

Commercial and Scientific Whaling

Subsection 3.17.3.2.2, Commercial and Scientific Whaling, describes the current conditions regarding international regulation of commercial and scientific whaling. Since the early 1970s, the United States has consistently supported the moratorium on commercial whaling and insisted on safeguards before any such whaling can resume. The United States has also opposed lethal scientific whaling. To support its position, the United States has cited management concerns rather than a philosophy that all whaling of any kind should be banned. Throughout the period of time the United States has opposed commercial and lethal scientific whaling, it has supported aboriginal subsistence whaling, for example, by proposing and defending bowhead catch limits on behalf of Alaska Natives. Given the consistent U.S. position of opposing commercial and lethal scientific whaling while supporting aboriginal subsistence whaling, it is unlikely that NMFS' authorization of a Makah tribal hunt under Alternatives

2 through 6 would change the United States' position on commercial and lethal scientific whaling or its ability to actively pursue its position.

It is also unlikely that other countries could use authorization of a Makah whale hunt under Alternatives 2 through 6 as leverage for increased commercial or scientific whaling. Though Japan attempted to use the United States' bowhead catch limit request in 2002 in its pursuit of small-type coastal whaling, there is no evidence that this move led to a fundamental change in the United States' position, in the positions of other countries, or in the international regulation of whaling. There is also no evidence that whaling proponents such as Japan could successfully use the United States' authorization of a Makah hunt under domestic law as leverage to change the regulation of commercial or scientific whaling. It is more likely that the outcome of Japan's requests for small-type coastal whaling, or the pro-whaling nations' efforts to remove the moratorium on commercial whaling, depends on the balance of power in the IWC rather than on strategic maneuvers such as those that took place in 2002 over the bowhead catch limit.

The support of Japan and the other pro-whaling countries for the ENP gray whale catch limit even as they were opposing the bowhead catch limit in 2002 (3.17.3.2.3 Aboriginal Subsistence Whaling) also suggests that pro-whaling countries do not view the Makah hunt as leverage to change the regulation of commercial or scientific whaling. In 2007, bowhead and ENP gray whale aboriginal subsistence catch limits were set by consensus at the annual meeting of the IWC (Subsection 1.4.1.2.1, Relevant Overview of Requests for Bowhead Whales on Behalf of Alaska Eskimos; Subsection 1.4.1.2.2, Overview of Requests for ENP Gray Whales on Behalf of the Makah). The IWC set these catch limits again in 2012 in a block vote with the humpback catch limit request of St. Vincent and the Grenadines (Subsection 1.4.1.2.2, Overview of Requests for ENP Gray Whales on Behalf of the Makah).

Pro-whaling nations have argued that all whaling should be treated equally, limited only by principles of sound science and management. These nations could argue that the resumption of whaling by the Makah Tribe justifies an increase in other types of whaling. They might also argue that the ability of the Makah Tribe to sell handicrafts made from inedible parts (which would be authorized under Alternatives 2 through 6) makes the hunt "commercial," although this is allowed under the IWC's definitions for "subsistence use" and "aboriginal subsistence whaling." We consider it unlikely, however, that pro-whaling nations would be able to use this argument as leverage to change the regulation of commercial or scientific whaling. The United States and several other countries have a long history of opposing commercial and scientific whaling while supporting aboriginal subsistence whaling; thus, authorization of a Makah hunt would not introduce a new element into the long-standing debate over whether there is a difference between commercial and subsistence hunts. Moreover, Alaska Natives have been authorized under domestic law to make and sell handicrafts made from bowhead whales.

A final piece of evidence suggests that aboriginal subsistence whaling generally, and authorization of a Makah hunt in particular, would not influence the debate over commercial and scientific whaling. The working group proposal presented at the 2010 IWC meeting included trade-offs between scientific and commercial whaling (Subsection 3.17.3.2.2, Commercial and Scientific Whaling). Aboriginal subsistence whaling appears not to have been a consideration in the proposed compromise between scientific and commercial whaling interests.

To further test the conclusion that authorization of a Makah hunt under Alternatives 2 through 6 would not alter international regulation of commercial or scientific whaling, we analyzed the trends both before and after the initial U.S. request for a catch limit on behalf of the Makah Tribe. If a Makah hunt were to set a precedent that would affect whaling internationally, such effects would likely be revealed shortly after the United States made its request. Figure 4-2 shows trends in commercial whaling, which declined prior to 1993, increased from 1993 through 1997, then flattened after 1998. The decline in commercial harvest began in 1988, following adoption of the commercial whaling moratorium and the U.S. threat to withdraw fishing privileges for Japanese vessels in U.S. waters (Subsection 3.17.3.2.2, Commercial and Scientific Whaling). Commercial whaling resumed in 1993, before the first U.S. request at the IWC on behalf of the Makah Tribe, and increased until 1998, at which point the trend leveled off. This record does not suggest that the U.S. request for an aboriginal subsistence catch limit of gray whales for the Makah Tribe led to a change in the regulation of commercial whaling or a change in the level of whales harvested commercially.

Figure 4-3 shows the data for scientific whaling, which increased steadily from 1986 through 1996, and continued to increase after 1997, though there is no statistically detectable trend from 1997 to the present. This record also does not suggest that the U.S. request for an aboriginal subsistence catch limit of gray whales for the Makah Tribe led to a change in the regulation of scientific whaling or a change in the level of whales harvested in scientific studies.

Aboriginal Subsistence Whaling

Compared to the No-action Alternative, there is a potential that NMFS' authorization of a Makah whale hunt under Alternatives 2 through 6 would be viewed as an expansion of the definition of aboriginal subsistence whaling, leading to increased requests at the IWC for aboriginal subsistence catch limits, changes in the regulation of aboriginal subsistence whaling, and ultimately an increase in whaling within that category. One distinction between Makah whale hunting and other aboriginal subsistence hunts approved by the IWC is the Tribe's 70- to 80-year hiatus in whaling. There is the possibility that pro-whaling nations would use a perceived expansion of the definition to bolster their requests for whaling operations that have characteristics similar to aboriginal subsistence whaling but differ in some way. Japan's argument that small-type coastal whaling is similar to aboriginal subsistence whaling is an example of how an IWC party might use Makah whaling to support its desired whaling operations.

Such an argument has been made, however, even in the absence of a Makah hunt. While there is evidence that pro-whaling parties within the IWC will use the authorization of any whaling activities, including a Makah hunt for gray whales, to support their efforts to receive approval for their proposed whaling operations, it is speculative whether such maneuvers would lead to a change in the regulation of aboriginal subsistence whaling or an increase in such whaling. Language adopted by the IWC when the joint United States-Russian Federation request was first approved referred to "aborigines whose traditional aboriginal subsistence and cultural needs have been recognized," suggesting the possibility that each IWC party was free to recognize the subsistence and cultural needs of its aborigines (IWC 1998). This language, which was subsequently deleted from the schedule, appears not to have influenced subsequent discussion in the IWC about the definition of aboriginal subsistence whaling or the determination of need.

As noted above, if a Makah whale hunt were to have a precedential effect on whaling regulations, it is likely such an effect would have been manifested following approval of the initial U.S. request for a catch limit on the Makah Tribe's behalf. Figure 4-4 shows the trend in aboriginal subsistence harvests from 1984 through 2013. The trend prior to 1998 is confounded by the fact that the hunt by the Chukotka Natives ceased altogether in 1992 and 1993 following the dissolution of the Soviet Union and state support for the hunt. It began to rebuild slowly and did not recover to the point that the full catch limit was harvested until 1998.

Looking just at the trend since 1997 when the Makah catch limit was approved, there has been a slight increasing trend in aboriginal subsistence harvests. The trend is weakly defined; only 27 percent of the harvest variability is explained by the trend line. The trend becomes much slighter if 1997 is dropped out. The rationale for dropping 1997 is that it is unlikely there would have been any effect on harvests in 1997 from the U.S. request made and approved in October 1997. Thus, it appears that any correlation (which does not imply causation) with the U.S. request for a Makah hunt is weak.

We also examined the history of requests in the IWC for aboriginal subsistence catch limits since the initial U.S. request for a Makah gray whale catch limit in 1997. Since then, there have been no requests from additional countries for an aboriginal subsistence catch limit and no requests on behalf of additional aboriginal groups. Denmark/Greenland and St. Vincent and the Grenadines have requested increases to their catch limits, but these were made on the basis of aboriginal needs and there is no indication the requests were in response to the U.S. request for gray whales. From 1998 to 2013, aboriginal subsistence strike and catch limits (i.e., annual not-to-exceed levels reported in the IWC annual reports) for all species have fluctuated between 403 and 432 animals. There is no apparent correlation between these limits and the actual numbers of whales harvested by aboriginal subsistence hunters, as evidenced by some of the lowest harvests occurring during a period with the highest overall aboriginal catch limits (Figure 4-4).

For these reasons, we consider it unlikely that authorization of a Makah whale hunt under Alternatives 2 through 6 would change the international regulatory landscape for aboriginal subsistence whaling or lead to the increased harvest of whales in aboriginal subsistence whale hunts (relative to the No-action Alternative).

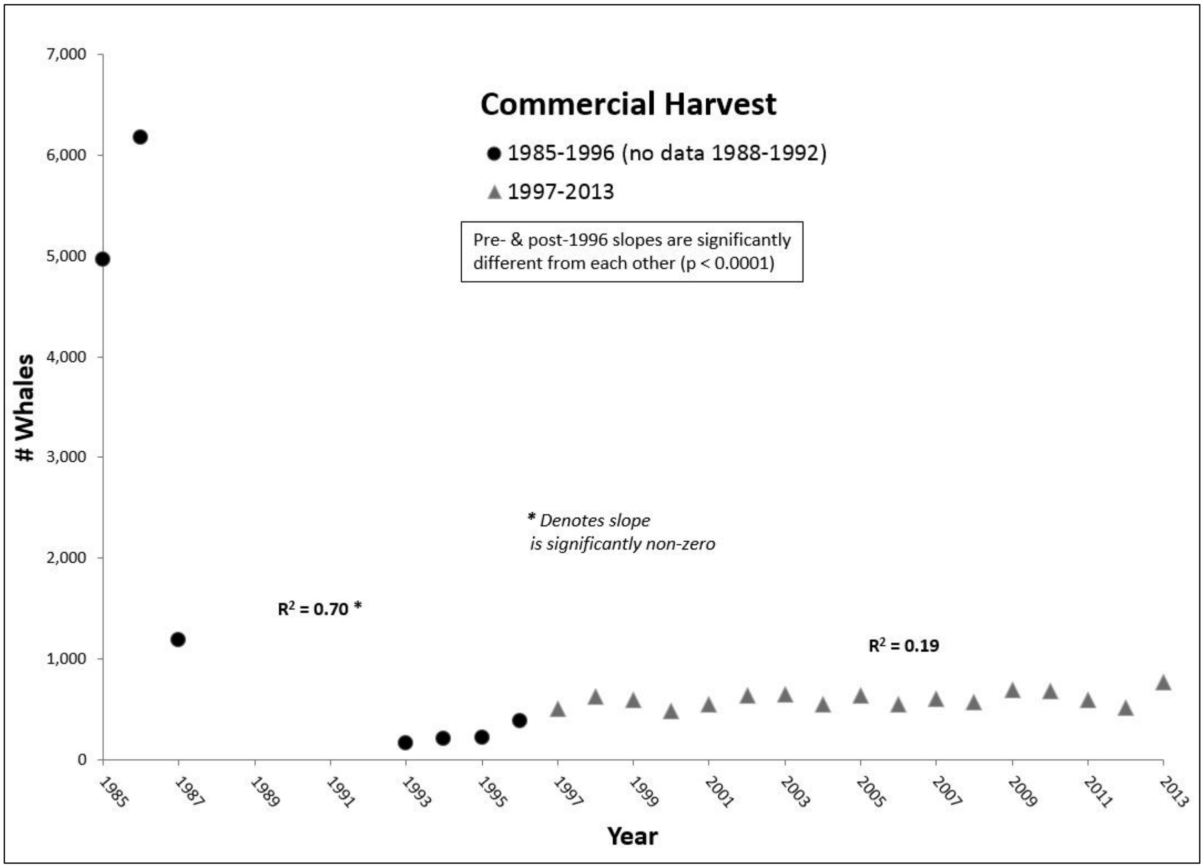

Figure 4-2. Trend analysis for commercial harvest before and after 1996.

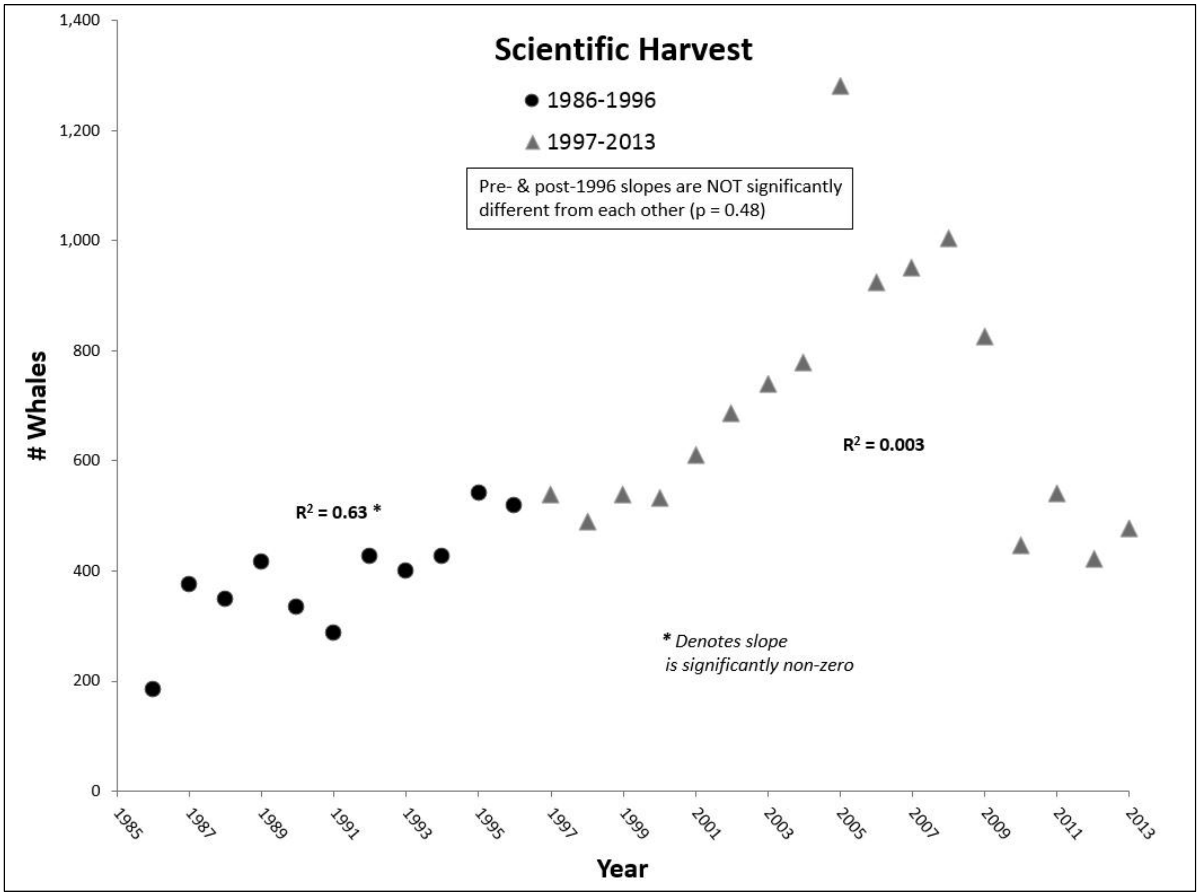

Figure 4-3. Trend analysis for scientific whaling before and after 1996.

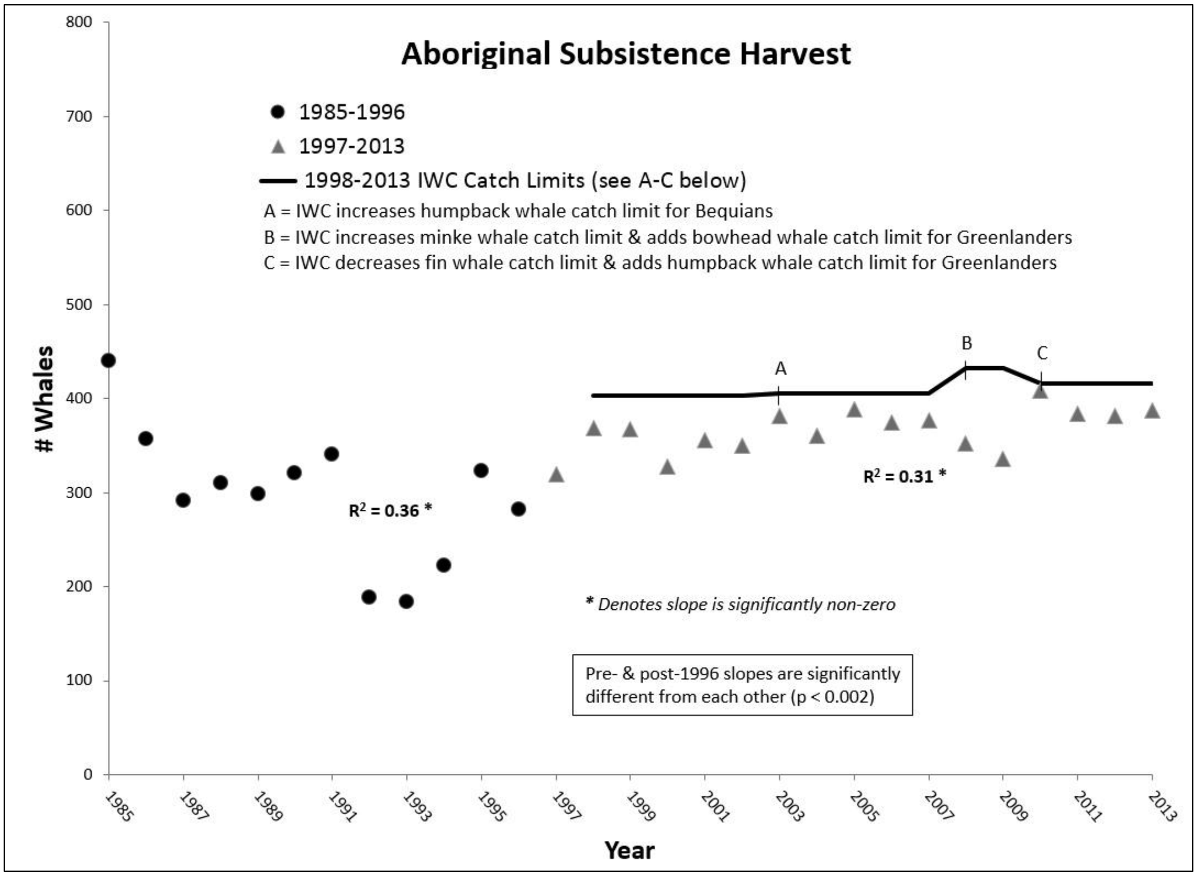

Figure 4-4. Trend analysis for aboriginal subsistence whaling before and after 1996.

4.18 Alternative Comparison by Resource

Table 4-15 draws together the conclusions from the information and discussion presented above in the "Evaluation of Alternatives" subsections, and provides the result of our analyses in a brief summary for each of the resources. This table is provided as an aid for the reader but is not intended to replace the more substantive discussion in the subsections above. Alternative 1 is the No-action Alternative and is the baseline for comparing the action alternatives.

Table 4-15. Summary of Effects of the Various Alternatives.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
WATER QUALITY	**Drinking Water Sources**	Current risk levels would continue.	No expected effect.	Similar to Alternative 2.	Similar to Alternatives 2 and 3.	Similar to Alternatives 2-4.	Similar to Alternatives 2-5.	None of the action alternatives are likely to increase the risk of adverse impacts on drinking water sources.
	Marine Waters	Current risk levels would continue (includes occasional disposal of drift whale carcasses).	Increased vessel traffic creates increased risk of fuel spills, but spills would be small scale, localized, and rapidly diluted. Spills could also be mitigated by modifying existing spill response plans. Negligible increased risks from disposal/leakage of whale carcasses.	Similar to Alternative 2, although restricting the hunt to offshore marine waters and the reliance on motorized vessels could increase the risk of spills in offshore marine waters. Negligible increased risks from disposal/leakage of whale carcasses.	Lower than Alternatives 2 and3; fewer hunt-related trips and better weather conditions would reduce the risk of vessels capsizing in unanticipated storms. Negligible increased risks from disposal/leakage of whale carcasses.	Lower than Alternatives 2 and 3, but greater than Alternative 4 (based on number of hunt-related trips). Negligible increased risks from disposal/leakage of whale carcasses. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternatives 2 and 3.	All action alternatives are likely to increase the risk of adverse impacts on marine waters. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

	Resources	Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
MARINE HABITAT AND DEPENDENT SPECIES	**Pelagic Species and Communities**	Current levels of disturbance would continue.	Increased vessel traffic and carcass hauling could result in local, short-lived disturbance of fish, zooplankton, and other pelagic species. No appreciable ecological effects.	Similar to Alternative 2, although the potential for disturbance would be largely restricted to offshore areas.	Lower than Alternatives 2 and 3 because of reduced hunt-related traffic.	Lower than Alternatives 2 and 3, but greater than Alternative 4 because of increased hunt-related traffic. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternatives 2 and 3, but greater than Alternatives 4 and 5 because of increased hunt-related traffic.	All action alternatives are likely to increase the risk of adverse impacts on pelagic species and communities. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
	Benthic Species and Communities	Current levels of disturbance would continue.	Increased vessel traffic and carcass hauling could result in local, short-lived disturbance of marine plant, macroalgal, shellfish, and other benthic species. No appreciable ecological effects.	Similar to Alternative 2.	Similar to Alternatives 2 and 3.	Similar to Alternatives 2-4. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternatives 2-5.	All action alternatives could increase the risk of adverse impacts on benthic species and communities. Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
GRAY WHALES	**ENP Gray Whale Stock**	Current IWC-set catch limits would continue. ENP gray whale stock is likely to remain at or near carrying capacity.	No discernable impacts because overall harvest would remain at IWC-set levels.	Similar to Alternative 2.	Similar to Alternatives 2 and 3.	Similar to Alternatives 2-4.	Similar to Alternatives 2-5.	None of the action alternatives are likely to increase the risk of adverse impacts on the ENP gray whale stock.
GRAY WHALES	**WNP Gray Whale Stock**	The IWC has not set a catch limit for WNP gray whales.	A small likelihood (median probability = 0.012) of striking a WNP gray whale each year if the maximum number of strikes occur.	Smaller likelihood (median probability = 0.010) of striking a WNP gray whale compared to Alternative 2.	No impacts expected based on hunt timing.	Smaller likelihood (median probability = 0.009) of striking a WNP gray whale compared to Alternatives 2 and 3.	Smaller likelihood (median probability = 0.006) of striking a WNP gray whale compared to Alternatives 2, 3, and 5.	All action alternatives (except perhaps Alternative 4) are likely to increase the risk of adverse impacts on the WNP gray whale stock. Alternative 2 would have the most risk while Alternative 4 would have the least risk.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
GRAY WHALES (CONTINUED)	**PCFG Gray Whales**	No hunting would occur in the PCFG seasonal range.	Under current conditions, 2.8 (maximum of 6) PCFG whales are likely to be killed per year. If more than 3.0 whales are killed, they may not be replaced in a subsequent year and would exceed current estimates of PBR. It is unclear whether the intensity of unsuccessful harpoon attempts (17 per year) or approaches (142 per year) would result in more than a temporary disturbance of PCFG whales and cause them to avoid this portion of their range.	Compared to Alternative 2, approximately 1.2 (maximum of 3) PCFG whales are likely to be killed per year, and slightly fewer PCFG whales would be subjected to unsuccessful harpoon attempts (14.5 per year). The number of PCFG whales approached per year would be the same as Alternative 2.	Compared to Alternative 2, the hunt would focus on known males in the PCFG seasonal range. The maximum and likely number of PCFG whales killed per year is 1. Also, fewer PCFG whales would be subjected to unsuccessful harpoon attempts (6 per year) and approaches (58 per year).	Compared to Alternative 2, approximately 0.2 (i.e., one PCFG whale every 5 years) and a maximum of one PCFG whale is likely to be killed per year. Far fewer PCFG whales would be subjected to unsuccessful harpoon attempts (1.2 per year) and approaches (49 per year). Effects would be the same as the No-action Alternative during years of hunt hiatus.	Compared to Alternative 2, approximately 1.4 (maximum of 3.5) PCFG whales are likely to be killed per year, and half the PCFG whales would be subjected to unsuccessful harpoon attempts (8.5 per year). The number of PCFG whales approached per year would be the same as under Alternative 2.	All action alternatives are likely to increase the risk of adverse impacts on PCFG gray whales. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
GRAY WHALES (CONTINUED)	**Gray Whales Using the Makah U&A and OR-SVI Areas**	No hunting would occur in local survey areas.	Under current conditions, 2.3 Makah U&A whales or 2.6 OR-SVI whales might be killed per year. It is unclear whether killed whales would be replaced in the same year in which they were killed or in subsequent years because of the uncertainties regarding PCFG recruitment. It is also unclear whether the intensity of unsuccessful harpoon attempts (14 to 16 per year) or approaches (117 to 131 per year) would result in more than a temporary disturbance of whales using local survey areas.	Compared to Alternative 2, slightly fewer Makah U&A or OR-SVI whales might be killed (2.0 to 2.2 per year). The number of such whales subjected to unsuccessful harpoon attempts would also be lower (12 to 13 per year); however, the number approached per year would be the same as under Alternative 2.	Compared to Alternative 2, the hunt would focus on known males in the PCFG seasonal range. The maximum and likely number of Makah U&A or OR-SVI whales killed per year is 1. Also, fewer whales would be subjected to unsuccessful harpoon attempts (6 per year) and approaches (58 per year).	Compared to Alternative 2, far fewer Makah U&A or OR-SVI whales might be killed (0.16 to 0.18 per year, or roughly 1 whale every 6 years). The number of such whales subjected to unsuccessful harpoon attempts (approximately one per year) and approaches (6 to 7 per year) would also be much lower than under Alternative 2. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Compared to Alternative 2, fewer Makah U&A or OR-SVI whales might be killed (1.2 to 1.3 per year). The number of such whales subjected to unsuccessful harpoon attempts would also be lower (7 to 8 per year); however, the number approached per year would be the same as under Alternative 2.	All action alternatives are likely to increase the risk of adverse impacts on gray whales using local survey areas. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
GRAY WHALES (CONTINUED)	**Individual Whales**	On average, 124 whales could be harvested in the Chukotkan hunt annually, experiencing manner and time to death particular to that hunt. Approximately 3 percent would be struck and lost.	On average, four whales annually could be harvested in a Makah hunt rather than a Chukotkan hunt. Manner and time to death would be similar to the Chukotkan hunt (if Makah use grenades) or shorter (if Makah use a .50 caliber rifle). As many as 43 percent (i.e., 3 out of 7 whales) could be struck and lost in a Makah hunt, compared to approximately 3 percent under Alternative 1. It is uncertain whether the intensity of unsuccessful harpoon attempts (42 per year) or approaches (353 per year) would result in more than a temporary disturbance of whales.	Similar to Alternative 2 except that motorized hunts may result in quicker kills and fewer struck-and-lost whales. The number of whales subjected to disturbance from unsuccessful harpoon attempts would also be lower (36 per year); however, the number approached per year would be the same as under Alternative 2. Approaches by non-hunt-related vessels might also be lower because of the offshore nature of this hunt.	Similar to Alternative 2 except that summer/fall hunts would have better ocean and weather conditions that may result in quicker kills and fewer struck-and-lost whales. Also, fewer whales would be subjected to disturbance from unsuccessful harpoon attempts (6 per year) and approaches (58 per year).	Similar to Alternative 2 except that the number of whales subjected to disturbance from unsuccessful harpoon attempts (30 per year) and approaches (122 per year) would be lower. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternative 2 except that the number of whales subjected to disturbance from unsuccessful harpoon attempts would be lower (21 per year), while the number approached would be the same.	All action alternatives are likely to increase the risk of adverse impacts on individual gray whales. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
OTHER WILDLIFE SPECIES	**Marine Mammals**	Current levels of disturbance would continue.	Hunt-related activities would increase the number of vessels and aircraft and the amount of noise in the project area over approximately 60 days. Chance of disturbance is low because the project area is large, most hunting would occur well offshore of pinniped haulouts, and most marine mammals do not associate with gray whales (except killer whales). Any disturbance would be temporary and localized. Injury from vessel collisions or projectiles is unlikely.	Similar to Alternative 2, although limiting hunt to offshore marine areas would likely reduce any disturbances and risks to marine mammals (e.g., all pinniped haulouts are within 5 miles of shore).	Similar to Alternatives 2 and 3, but fewer hunt-related trips. There is a greater potential for hunt-related activities to disturb seals and sea lions because hunted whales would likely be feeding closer to shore and in close proximity to islands, rocks, and pinniped haulouts.	Lower than Alternative 2 (because of fewer hunt-related trips) and Alternative 4 (because of seasonal restrictions), but potentially higher than Alternative 3 because hunting would be closer to shore. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternative 2.	All action alternatives could increase the risk of adverse impacts on marine mammals. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
	Other Marine Wildlife	Current levels of disturbance would continue.	Hunt-related activities would increase the number of vessels and aircraft and the amount of noise in the project area over approximately 60 days. Disturbance would vary among species and habitat associations and in most cases would be localized and temporary. Most serious impact would be nest abandonment. Tatoosh and White Rock Islands would have buffers. Concerns about nest abandonment could be addressed by including buffers around other rocks and islands.	Similar to Alternative 2, although limiting the hunt to offshore marine areas would likely reduce any risks to other marine wildlife (e.g., all rocks and islands used for nesting are within 5 miles of shore).	Although hunting would occur on fewer days than under Alternatives 2 and 3, disturbance of seabirds, bald eagles, and murrelets could be higher given the overlap with nesting, fledging, and foraging periods.	Lower than Alternative 2 (because of fewer hunt-related trips) and Alternative 4 (because of seasonal restrictions), but potentially higher than Alternative 3 because hunting would be closer to shore. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternative 2.	All action alternatives could increase the risk of adverse impacts on other marine wildlife. Alternative 2 would likely have the most impact while Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
ECONOMICS	**Tourism**	No opportunity for Tribe to promote hunt-related tourism and no likelihood of hunt-related boycott. Potential for small disproportionate effect on Tribe.	Ability to hunt creates opportunity for Tribe to promote hunt-related tourism. Also potential for hunt-related boycott. Potential inclement weather could deter visitors.	Similar to Alternative 2.	Similar to Alternatives 2 and 3. Tourist visitation could be greater during the summer; however, there would be fewer days of hunting.	Similar to Alternatives 2 and 3, although fewer days of hunting could result in smaller increase of visitors. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternative 2.	All action alternatives are likely to have a mix of beneficial and adverse impacts on tourism. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.
ECONOMICS	**Household Use of Whale Products**	Current limited availability of drift whales and whales incidentally caught in fishing operations (potentially one whale every 10 years).	Products from up to four whales annually (on average) would be available for household consumption, and manufacturing and selling of traditional handicrafts.	Lower than Alternative 2 because it is less likely that four whales would be harvested annually. The use of motorized vessels could increase access to fresh whale products during winter months when canoe hunts may be less likely.	Lower than Alternatives 2 and 3 because fewer whales could be killed.	Similar to Alternative 4 because fewer whales would likely be killed compared to Alternatives 2 and 3. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternative 2, but only 3.5 whales could be harvested per year (on average).	All action alternatives are likely to have beneficial impacts on household use of whale products. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
ECONOMICS	**Whale-watching Industry**	Current levels of revenues from, and employment in, whale-watching industry would continue.	Level of gray whale harvest under Alternative 2 would not be expected to change whale-watching interest or opportunities and therefore not likely to affect whale-watching revenues or employment.	Similar to Alternative 2.	Similar to Alternatives 2 and 3.	Similar to Alternatives 2-4.	Similar to Alternatives 2-5.	None of the action alternatives are likely to increase the risk of adverse impacts on the whale-watching industry.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
ECONOMICS (CONTINUED)	**Shipping and Ocean Sport/ Commercial Fishing**	Current passage conditions for ships and fishing vessels would continue.	Activating an MEZ during 33 likely days of hunting could temporarily disrupt shipping/fishing traffic, but only minor economic impacts would be expected.	Similar to Alternative 2, although with potentially more days (43 days) when MEZ would be activated but during a period when most sport salmon fishing does not occur.	Fewer likely hunting days (7) would result in lower effects compared to Alternatives 2 and 3, but hunting during the summer could have slightly greater effects on salmon sport fishing.	Similar to Alternatives 2-4, although the reduced number of hunt days compared to Alternatives 2, 3, and 6 would result in a smaller increase in interference with commercial shipping and fishing (especially during years of hunt hiatus). Would result in lower potential of disturbance to salmon fishing compared to Alternative 4 because of hunting not being allowed during summer months.	Similar to Alternative 2.	All action alternatives could increase the risk of adverse impacts on shipping and ocean sport/commercial fishing. Alternative 3 would likely have the most impact, while Alternative 5 would likely have the least impact.
ECONOMICS (CONTINUED)	**Management and Law Enforcement**	No change from current conditions.	Costs would be incurred for a hunt observer, and for federal, tribal, state, and local law enforcement agents and resources (e.g., helicopters and boats) to monitor the hunt and manage any protest activities.	Similar to or less than Alternative 2 because restricting hunts to offshore areas may result in a decreased need for law enforcement response.	Similar to Alternatives 2 and 3, although fewer days of hunt-related trips would result in a lower cost.	Similar to Alternatives 2-4, although would result in a lower cost than Alternatives 2 and 3, but more than Alternative 4 because of fewer days of hunt-related trips. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternative 2.	All action alternatives are likely to increase the risk of adverse impacts on management and law enforcement. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

	Resources	Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	**Impact and Magnitude Relative to No-action Alternative**
ENVIRONMENTAL JUSTICE	**Economics**	Current levels of tourism would continue. Current occasional household use of products from drift whales and whales incidentally caught in fishing operations (potentially one whale every 10 years).	Potential for short-term increase in visitors to Neah Bay during 7 to 30 days of hunting. Other visitors might avoid Neah Bay because of a hunt. Long-term effects on number of visitors are uncertain. Household use of products from up to four whales.	Similar to Alternative 2, but possibly fewer whale products available when hunts are curtailed because of the mortality limit on PCFG whales.	Fewer hunt days and whales would result in a smaller increase in economic benefits than under other Alternatives.	Similar or lower economic benefits than Alternatives 2 and 3 because of fewer hunt days and number of whales likely harvested. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar or lower economic benefits than Alternatives 2, 3, and 5 (but higher than Alternative 4) because of number of whales likely harvested.	All action alternatives are likely to have a mix of beneficial and adverse impacts on economics. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.
	Ceremonial and Subsistence Resources	Current limited availability of drift whales and whales incidentally caught in fishing operations (potentially one whale every 10 years). Lack of access to resource has disproportionate impact on Tribe.	Consistent with Makah's stated need for access to ceremonial and subsistence resources.	Similar to Alternative 2, but possibly fewer whale products available when hunts are curtailed by the mortality limit on PCFG whales.	Fewer hunt days and whales would result in a smaller increase in ceremonial and subsistence effects than under other Alternatives.	Similar or lower ceremonial and subsistence effects than Alternatives 2 and 3 because of fewer hunt days and number of whales likely harvested. Stored whale products may still be available during years of hunt hiatus.	Similar or lower ceremonial and subsistence effects than Alternatives 2, 3, and 5 (but higher than Alternative 4) because of number of whales likely harvested.	All action alternatives are likely to have beneficial impacts on ceremonial and subsistence resources. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
ENVIRONMENTAL JUSTICE (CONTINUED)	**Social Environment**	Potential for tension between Makah Tribe and others, including federal government.	Potential for tension between Makah Tribe and others. Potential for social bonding among some tribal members and tension among others. Native Americans generally might be reassured by U.S. support for traditional tribal activity.	Similar to Alternative 2.	Similar to Alternatives 2 and 3, although limits on maximum number of whales struck/harvested would result in fewer occasions for hunt-related social interactions compared to Alternatives 2 and 3.	Similar to Alternatives 2-4, although tension may be reduced during years of a hunt hiatus.	Similar to Alternatives 2-5.	All action alternatives are likely to have a mix of beneficial and adverse impacts on the social environment. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
SOCIAL ENVIRONMENT	**Makah Tribal Members, Other Tribes, and Other Individuals and Organizations**	Likely no protests and related social tensions. No change from current level of tension between members opposed to the hunt and those supporting it. The latter may feel continued frustration with U.S. government.	Tension could increase between hunt opponents and supporters, with opponents likely to protest. Supporters are likely to feel reassured by U.S. government support for traditional tribal activity.	Some hunt opponents may feel less tension if there is a reduced likelihood of the Tribe killing a PCFG whale in nearshore waters. Tension may increase for some hunt supporters and opponents if there is an emphasis on hunting without the traditional use of canoes. The degree of tension by hunt opponents could be affected by the number of whales killed. The maximum number of whales killed would be 3, predicted at 1.2, resulting in lower potential of social tension in comparison to Alternative 2.	Similar to Alternatives 2 and 3, although the decrease in hunting days would result in fewer opportunities for expression of social tension than other alternatives with sustained hunt times. Degree of tension expressed by hunt opponents could be affected by whales killed. Maximum number of whales hunted under Alternative 4 is one, potentially resulting in a lesser degree of social tension.	Similar to Alternatives 2-4, although the decrease in hunting days (as well as the hunt hiatus) would result in fewer opportunities for expression of social tension than other alternatives with sustained hunt times. The maximum of one whale being killed would decrease the potential for social tension in comparison to other alternatives.	Similar to Alternatives 2-5, although having a lower potential for expression of social tension than Alternative 2 but a greater potential than Alternatives 4 and 5 based on the likely number of whales killed.	All action alternatives are likely to have a mix of beneficial and adverse impacts on Makah tribal members, other tribes, and other individuals and organizations. Alternative 2 would have the greatest likelihood of mixed impacts while Alternative 5 would have the least.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
CULTURAL RESOURCES	**Sites with Cultural Significance**	No change from current conditions.	It is possible, but improbable, that activities related to a whale hunt would damage or disturb (e.g., encroachment by observers) existing, listed archaeological or historic sites. Unlisted sites traditionally used by Makah whalers would be enhanced by their use for whale hunting-related ceremonies.	Similar to Alternative 2.	Similar to Alternatives 2 and 3.	Similar to Alternatives 2-4. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternatives 2-5.	All action alternatives are likely to have a mix of beneficial and adverse impacts on sites with cultural significance. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
CEREMONIAL AND SUBSISTENCE RESOURCES	**Access to Whale Hunting Opportunities**	No change from current conditions, i.e., no access to whale hunting opportunities.	Compared to No-action Alternative, increased access to hunting opportunities associated with harvesting an average of four whales per year.	Similar to or less than Alternative 2 because hunts would be restricted to offshore marine waters and could be curtailed by the mortality limit on PCFG whales.	Fewer hunt days and whales would result in less access to hunting opportunities than under other Alternatives.	Fewer hunt days and whales would result in less access to hunting opportunities than under Alternatives 2 and 3. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar or lower access to hunting opportunities than Alternatives 2, 3, and 5 (but higher than Alternative 4) because of number of hunt days and whales likely harvested.	All action alternatives are likely to have beneficial impacts on access to whale hunting opportunities. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
	Subsistence Use	The Tribe could pursue some subsistence uses of whales (such as using drift whales or whales incidentally caught in fishing operations), but they would have limited cultural value if not practiced in connection with actual whale hunts.	Compared to the No-action Alternative, increased subsistence use of whales because of opportunity to hunt (up to 33 estimated days of hunting) and opportunity to process, share, and consume up to an average of four whales per year (maximum of five).	Similar to Alternative 2, except motorized hunts may increase the opportunity for subsistence use of whales in more seasons (including southbound whales in the winter). The Tribe's subsistence use would be less than Alternative 2 because no hunting would be allowed within 5 miles of the shore and restrictions on the mortality of whales could result in curtailment of hunting activities in some years, potentially before any whales are harvested.	The maximum harvest limit would satisfy 25% of the number of whales requested by the Makah Tribe.	The Tribe's subsistence use of whales would be less under Alternative 5 than Alternatives 2 and 3 because fewer whales would likely be harvested. Compared to Alternative 4, subsistence use could be greater because of the increase in the maximum number of whales harvested per year. Stored whale products may still be available during years of hunt hiatus.	Alternative 6 would impose an additional requirement on the Tribe requiring them to submit a new request for waiver and invest resources in the pursuit of a waiver if they desired to continue hunting after the initial 10-year waiver and regulation lapse. The average of 3.5 whales per year would be slightly lower than the amount requested by the Tribe to satisfy their needs (four whales). The Tribe's subsistence use of whales would be greater under Alternatives 2 and 3 and less under Alternatives 4 and 5 in comparison to Alternative 6 on the basis of allowance of harvested whales per year.	All action alternatives are likely to have beneficial impacts on subsistence use of whale products. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
CEREMONIAL AND SUBSISTENCE RESOURCES (CONTINUED)	**Traditional Knowledge and Activities**	The Tribe could continue to engage in many related activities, and could apply and transmit relevant knowledge, but this would have limited cultural value if not practiced in connection with actual whale hunts. Application and transfer of knowledge related to actual hunting would be limited to discussions of past whale hunting.	Tribe could engage in full range of activities and apply full range of knowledge associated with whale hunting, including searching for, striking, killing, towing, processing, sharing, and consuming whales.	Similar to Alternative 2 except that traditional knowledge associated with canoe hunting could be reduced if there is increased reliance on motorized hunt vessels.	Similar to Alternatives 2 and 3, although practicing the full range of activities would be of shorter duration than Alternatives with extended hunt times and higher potential harvest numbers.	Similar to Alternatives 2-4, although practicing the full range of activities would be less compared to alternatives with extended hunt times and higher potential harvest numbers. In comparison to Alternative 5, Alternatives 2 and 3 allow a greater amount of time for these activities, while Alternative 4 provides a lesser amount.	Similar to Alternatives 2-5, although practicing the full range of activities would be less compared to alternatives with extended hunt times and higher potential harvest numbers.	All action alternatives are likely to have beneficial impacts on traditional knowledge and activities. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.
	Spiritual Connection to Whaling	Spiritual connection to whaling would continue to be limited to connection to past whaling and spiritual connection may eventually wane.	Spiritual connection to whaling would be current and ongoing.	Similar to Alternative 2.	Similar to Alternatives 2 and 3.	Similar to Alternatives 2-4.	Similar to Alternatives 2-5.	All action alternatives are likely to have beneficial impacts on the Tribe's spiritual connection to whaling.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
CEREMONIAL AND SUBSISTENCE RESOURCES (CONTINUED)	**Cultural Identity**	Tribal identity could erode in the absence of opportunities to participate in an activity central to Makah cultural identity.	Makah whale-hunting rituals, spiritual training, songs, dances, and ceremonial activities could increase over current conditions and regularly recur, reinforcing Makah cultural identity. The opportunity to regularly harvest, process, share, and consume whale products could increase tribal members' sense of community. The whale-hunting ceremonies could provide an additional social framework, which could contribute to community social and spiritual stability.	Similar to Alternative 2.	Similar to Alternatives 2 and 3.	Similar to Alternatives 2-4.	Similar to Alternatives 2-5.	All action alternatives are likely to have beneficial impacts on the Tribe's cultural identity.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
NOISE	**Noise Levels at Receiving Properties**	No change from current conditions.	Increased noise levels from vessels and aircraft at receiving properties in Neah Bay and possibly along State Route 112 east of Neah Bay during an estimated 33 days of hunting and 60 days of hunt-related activity. Increased noise levels from 64 rifle shots or 12 grenade explosions. Noise may also be audible to recreational users in the hunt vicinity. Limited number of recreational visitors may be affected because hunting would occur in winter and early spring when visitation is lower.	Similar to Alternative 2 except that limiting hunt activity to offshore marine waters could reduce noise levels (especially from weapons discharge) at receiving properties because of increased distance.	Similar increased noise levels as in Alternative 2, occurring on fewer days compared to other action alternatives. Fewer rifle shots (16) and grenade explosions (3) compared to Alternative 2. This alternative has a greater potential than any others to disturb recreational users in the project area on any given day of hunting or hunt-related activities because of hunt time being in peak usage during summer months and the targeting of nearshore feeding whales.	Similar increased noise levels as in Alternative 2. Disturbance would occur on fewer days than Alternatives 2 and 3 but more days than Alternative 4. Same number of rifle shots and grenade explosions as Alternative 4. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar increased noise levels as in Alternative 2 (but a larger increase in noise levels than Alternatives 4 and 5 because of more hunting days and weapons discharges). Similar number of rifle shots (56) and grenade explosions (11) as Alternatives 2 and 3 (with 64 rifle shots and 12 grenade explosions).	All action alternatives are likely to increase the risk of adverse impacts on noise levels at receiving properties. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
AESTHETICS	**On-scene Observers**	Current lack of opportunity to view an authorized whale hunt would continue.	Harvest of four whales during an estimated 33 days of hunting would be visible to observers at beaches and vantage points along coastal portion of project area. Hunting during winter/spring period when visitation is lower would reduce number of unintentional observers.	Compared to Alternative 2, there would be about the same number of days of hunting (20 versus 7 to 30), but because hunting would be limited to offshore marine waters, fewer on-scene observers would unintentionally observe a whale being hunted.	Compared to Alternatives 2 and 3, there would be fewer days with hunt-related trips and opportunities for on-scene observers. However, the number of potential casual observers present in the project area on any given day of hunting would be greater under Alternative 4 than under the other action alternatives because hunting would occur during the summer months when recreational use of the project area is higher.	Compared to Alternatives 2 and 3, there would likely be fewer days of hunt-related trips and opportunities for on-scene observers. Alternative 5 would result in more days of hunt-related trips than Alternative 4, but those days would occur during the winter and spring months when recreational use of the project area is comparatively low. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternative 2.	All action alternatives are likely to have a mix of beneficial and adverse impacts on on-scene observers. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.
	Media Observers	Current lack of opportunity to view an authorized whale hunt would continue.	Any whale hunts would receive media coverage. However, inclement weather during the hunt period could limit media coverage.	Similar to Alternative 2 except that offshore hunting may reduce the ability of media outlets to directly observe hunt activity.	Similar to Alternatives 2 and 3, although having fewer hunt days would likely result in a smaller increase in media attention than other alternatives.	Compared to Alternatives 2 and 3, there would likely be fewer days of hunt-related trips and presence of media observers. Alternative 5 would result in more days of hunt-related trips than Alternative 4. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternative 2.	All action alternatives are likely to have a mix of beneficial and adverse impacts on media observers. Alternative 2 would have the greatest likelihood of mixed impacts while Alternative 5 would have the least.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
TRANSPORTATION	**Highway, Marine, and Air Traffic**	No change from current conditions.	Increased hunt-related traffic could increase potential for interference with highway, marine, or air traffic in the project area and could increase the risk of traffic accidents. However, hunts would be limited to the winter and early spring months and would not overlap with peak periods for highway or air traffic.	Similar to Alternative 2, although hunting would take place further offshore.	Fewer days of hunting (but in the summer) would likely result in fewer occasions for interference with highway, vessel, and air traffic, but a greater potential for each occasion to result in interference.	Similar to Alternatives 2 and 3, although the increased potential for interference, accidents, or impediments would be limited to the months of December and May (more likely during May), outside of the peak periods for highway and air traffic. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternatives 2.	All action alternatives are likely to increase the risk of adverse impacts on highway, marine, and air traffic. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
PUBLIC SERVICES	**Law Enforcement and Medical Facilities**	No change from current conditions.	Hunt-related protests could increase law enforcement needs, possibly diverting such resources from other missions. Persons suffering hunt-related injuries that exceed the capacities of local health facilities could be transported to other facilities in the region.	Similar to Alternative 2, except that potential motorized vessel hunts offshore in the winter and early spring could result in fewer hunt-related protest activities but could also increase the need for search/rescue and medical attention because of boating accidents associated with rough seas.	The potential for conflict between hunt-related law enforcement needs and other law enforcement needs would be higher during the summer; however, there is less potential for boating accidents because of better sea conditions.	Less than Alternatives 2 and 3 because of fewer hunt-related trips but greater than alternative 4. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternative 2.	All action alternatives could increase the risk of adverse impacts on law enforcement and medical facilities. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
PUBLIC SAFETY	**Injury from Weapons, Boating Accidents, and Land-based Protest Activities**	No change from current conditions.	Makah hunters, other participants, protesters, and bystanders would be at risk of injury from weapons, protest activities, or boating accidents during the winter and spring. Increased potential for hunt-related injury falls disproportionately on tribal members (but risk is voluntarily assumed by the Tribe).	The risk of injury from protest activities would be similar to Alternative 2. Limiting hunting to offshore marine waters would result in less risk of weapon-related injuries to bystanders on shore. However, boating accidents and weapon-related injuries for persons associated with the hunt could increase given the less favorable weather and sea conditions off shore.	Less than Alternatives 2 and 3 because of fewer hunting days and weapons discharges plus the ability to hunt during summer months (with more favorable weather and ocean conditions) would decrease the potential of injury from weapons and boating accidents.	Less than Alternatives 2 and 3 because of fewer hunting days and weapons discharges. Effects would be the same as the No-action Alternative during years of hunt hiatus.	Similar to Alternative 2, although slightly less risk because of fewer weapons discharges.	All action alternatives are likely to increase the risk of adverse impacts because of injury from weapons, boating accidents, and land-based protest activities. Alternative 2 would likely have the most impact, while Alternative 5 would likely have the least impact.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
HUMAN HEALTH	**Nutritional Benefits, Environmental Contaminants, and Exposure to Food-borne Pathogens**	No change from current conditions.	Insufficient information about nutritional value and contaminant levels in current Makah diet to predict the precise changes in exposure to contaminants or food-borne pathogens or the nutritional composition of the Makah diet if tribal members have the opportunity to consume freshly harvested whale. However, whale products, in particular blubber, could contain higher levels of certain contaminants.	Same lack of information as noted for Alternative 2. Nutritional benefits and contaminant exposure would be similar to Alternative 2 given the similar number of whales likely to be harvested each year.	Same lack of information as noted for Alternative 2. Nutritional benefits and contaminant exposure would be less than Alternatives 2 and 3 given the lower number of whales likely to be harvested each year.	Similar to or less than Alternative 4 given the potentially lower number of whales likely to be harvested each year.	Similar to Alternative 2.	All action alternatives are likely to have a mix of beneficial and adverse impacts associated with nutritional benefits, environmental contaminants, and exposure to food-borne pathogens. Alternative 2 would have the greatest likelihood of mixed impacts, while Alternative 5 would have the least.

Resources		Alternative 1 No-action	Alternative 2 Proposed Action	Alternative 3 Offshore Hunt	Alternative 4 Summer/Fall Hunt	Alternative 5 Split-season Hunt	Alternative 6 Different Limits on Strikes and PCFG Whales, and Limited Duration of Regulations and Permits	Impact and Magnitude Relative to No-action Alternative
NATIONAL AND INTERNATIONAL REGULATORY ENVIRONMENT	**Marine Mammals Nationally**	It is uncertain, but possible, that a decision not to authorize a Makah whale hunt could discourage future requests for a waiver of the MMPA.	Authorizing a Makah hunt may prompt other requests by Indian tribes for a similar waiver of the MMPA. The outcome of future requests would depend on the specific facts presented.	Similar to Alternative 2.	Similar to Alternatives 2 and 3.	Similar to Alternatives 2-4.	Similar to Alternatives 2-5.	It is uncertain what, if any, impacts the action alternatives are likely to have on the national regulatory environment for marine mammals.
	Worldwide Whaling	A U.S. decision not to authorize a Makah whale hunt is unlikely to influence the position of the United States or other countries regarding IWC issues.	It is unlikely that authorizing a Makah hunt would increase whaling worldwide by emboldening pro-whaling countries.	Similar to Alternative 2.	Similar to Alternatives 2 and 3.	Similar to Alternatives 2-4.	Similar to Alternatives 2-5.	It is uncertain what, if any, impacts the action alternatives are likely to have on worldwide whaling.

Section 5

Cumulative Effects

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5.0 CUMULATIVE EFFECTS

5.1 Background

5.1.1 Context for Analysis

The National Environmental Policy Act (NEPA) defines cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). Section 3, Affected Environment, described the current status of each resource, which reflects the effects of past and current actions. Section 4, Environmental Consequences, evaluated the effects of the Makah Tribe’s proposed hunt and the alternative actions on the current status of each resource. This section now considers the cumulative effects[1] of each alternative on each resource in the context of the effects of past actions, current conditions, and reasonably foreseeable future actions and conditions.

5.1.2 Geographical Area and Temporal Scope for Analysis

The Environmental Protection Agency (EPA 1999) makes the following recommendations regarding the geographical area of cumulative impact analyses:

- Geographic boundaries used in cumulative impact analysis should be based on all resources of concern and all of the actions that may contribute, along with the project effects, to cumulative impacts.
- Generally, the scope of analysis will be broader than the scope of analysis used in assessing direct or indirect effects.
- The proper spatial scope of the analysis should include geographic areas that sustain the resources of concern. Importantly, the geographical boundaries should not be extended to the point that the analysis becomes unwieldy and useless for decision-making.
- In many cases, the analysis should use an ecological region boundary that focuses on the natural units that constitute the resources of concern.

Separate guidance by the Council on Environmental Quality (CEQ 1997) notes the following steps for determining the appropriate area for the analysis of cumulative impacts:

[1] The terms “effect” and “impact” are used interchangeably in this EIS (consistent with Council on Environmental Quality regulations at 40 CFR 1508.8).

1. Determine the area that will be affected by the proposed action (i.e., the Tribe's hunt proposal); CEQ refers to this area as a "project impact zone."
2. Identify the resources within that zone that could be affected by the proposed action.
3. Determine the geographic areas occupied by those resources outside of the project impact zone. In most cases, the largest of these areas will be the appropriate area for the analysis of cumulative impacts.
4. Determine the affected institutional jurisdictions, both for the proposing agency and other agencies or groups.

The CEQ guidance also suggests that for migratory wildlife (e.g., gray whales), possible areas that could be used in a cumulative impact analysis could include breeding grounds, migration routes, wintering areas, or the total range of affected population units.

As described in Section 1, Purpose and Need, and Section 2, Alternatives, the proposed action and all other action alternatives would restrict gray whale hunts to the coastal portion of the Makah Tribe's U&A situated within the larger project area defined as the entire U&A and adjacent marine waters and land areas (refer to Figure 1-1). In accordance with CEQ guidance, we consider this larger area to be the project impact zone (referred to in this EIS as "project area"). The resources within the project area that could be affected by the proposed action are those addressed in Section 3, Affected Environment. Most are found within the project area, but some resources (e.g., gray whales and ships), are highly mobile and occupy areas outside of that area. After reviewing guidance by the CEQ (1997) and EPA (1999) and the alternatives and resources addressed in this EIS, we believe that the geographic area best suited for analyzing cumulative impacts consists of the entire range of the ENP stock, from the Arctic to Mexico. This area contains essential breeding, feeding, and migration habitats for the ENP stock of gray whales (which the Tribe proposes to hunt), as well as the PCFG whales that are a key resource of interest in this EIS. Also, within this area there are a wide range of activities that affect gray whales, ranging from site-specific impacts like ship strikes to large-scale impacts like climate change. In our analysis of cumulative impacts we discuss possible effects on WNP whales where appropriate; however, we did not include the geography of the Western North Pacific in our analysis area because it is not within the primary range of ENP whales that are the focus of the proposed action and action alternatives.

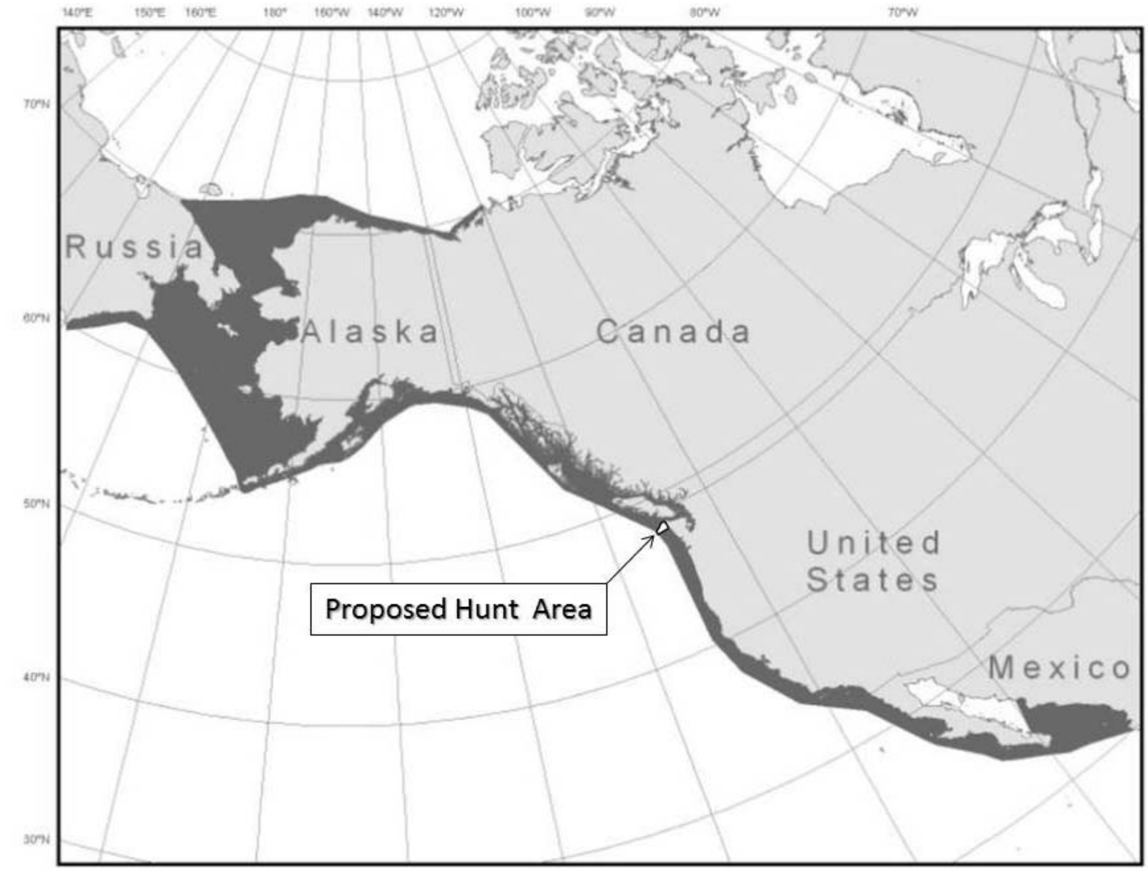

Figure 5-1. Analysis area (dark shading) for cumulative impacts relative to the proposed hunt area/project area. Adapted from Carretta et al. (2014).

To determine the temporal scope of our cumulative impact analysis, we reviewed guidance by the CEQ (1997) that notes the appropriate time frame should account for how far into the future the effects of the proposed action are projected to last. Similarly, guidance by the EPA (1999) notes that the most common temporal scope is the life of the project and that the analysis "should extend until the resource has recovered from the impact of the proposed action." We believe that it is not appropriate to limit our cumulative impact analysis to a specific time frame because the proposed action (and all but one of the other action alternatives) would have impacts for an indefinite period of time. Gray whales are long-lived animals and take 6 to 12 years to mature (Subsection 3.4.3.1.5, Reproduction and Calf Production), so it may take a long time to detect if the proposed action is affecting gray whales as expected under current harvest models (Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity, and Related Estimates, IWC Implementation Review of PCFG Gray Whales). In addition, killing even a few animals per year (especially over an extended period of time) from the relatively small PCFG could have long-lasting impacts for a group of whales whose population dynamics are not well understood.

Therefore, we recognize the long-term nature of the proposed action and its potential effects by acknowledging and considering them into the future.

5.1.3 Past, Present, and Reasonably Foreseeable Future Actions

Relevant past and present actions are those that have influenced the current condition of the resource. For the purposes of this EIS, past and present actions include both human-controlled events (such as subsistence harvest and commercial fisheries), and natural events (such as climate change) that also can be influenced by human activity. The cumulative impact analysis relies on the descriptions of current conditions (based on past and present actions) presented in Section 3, Affected Environment.

Reasonably foreseeable future actions are those that 1) have already been or are in the process of being funded or permitted, 2) are described or included as priorities in government planning documents, or 3) are likely to occur or continue based on traditional or past patterns of activity. Our analysis considers both human and natural actions that are occurring in the affected environment and impacting the resources being affected by the proposed action and alternatives. Reasonably foreseeable future actions to be considered must also fall into the temporal and geographic scope described in Subsection 5.1.2, Geographical Area and Temporal Scope for Analysis.

Reasonably foreseeable future actions were identified from scoping for this EIS and the large body of information used to develop Section, 3 Affected Environment, with particular attention given to those actions likely to affect gray whales. We determined that the following actions should be addressed in our cumulative impact analysis: harvest of gray whales, shipping, military exercises, fisheries, tourism, marine energy and mining projects, scientific research, natural mortality, climate change, and U.S. government policy. Table 5-1 compares those actions with past and present actions, Subsections 5.1.3.1 through 5.1.3.9 describe each action’s impacts and its relevance to our analysis, and Figures 5-2 and 5-3 show the location of several of these actions (i.e., those with available geographic data) relative to the analysis area and the proposed hunt area/project area.

Table 5-1. Past, present, and reasonably foreseeable future actions considered in the cumulative impact analysis.

Action	Past and Present	Reasonably Foreseeable Future
Harvest	Subsistence and commercial harvest	Subsistence harvest
Shipping	Shipping and liquefied natural gas terminals	Shipping and liquefied natural gas terminals
Military Exercises	Naval testing and training	Naval testing and training
Fisheries	Pot and net fisheries	Pot and net fisheries
Tourism	Whale watching	Whale watching
Marine Energy and Mining Projects	Oil and gas exploration and extraction, and mineral and salt mining	Oil and gas exploration and extraction, mineral and salt mining, and wave and tidal energy projects
Scientific Research	Biological and oceanographic surveys	Biological and oceanographic surveys
Natural Mortality	Predation, disease, and starvation	Predation, disease, and starvation
Climate Change and Ocean Acidification	Global warming and ocean acidification	Global warming and ocean acidification
U.S. Government Policy	Past government policies discouraging or forbidding some cultural practices, including those related to whaling	Maintenance of Treaty between the U.S. and Makah Tribe

5.1.3.1 Harvest

Gray whales have been harvested by aboriginal hunters in the North Pacific for more than a thousand years (Krupnik 1984; O'Leary 1984). Details and issues related to past and present aboriginal harvest of gray whales can be found in the following subsections of this DEIS:

- 1.2.4.1.3, IWC Aboriginal Subsistence Whaling
- 1.4.1, Summary of Aboriginal Subsistence Whaling Catch Limits
- 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates
- 3.4.3.6.1, Aboriginal Subsistence Whaling
- 4.1.1.3, Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested
- 4.17, Regulatory Environment Governing Harvest of Marine Mammals

Since 2004, the IWC Schedule has read as follows for the ENP gray whale stock catch limit:

> [T]he taking of gray whales from the Eastern stock in the North Pacific is permitted, but only by aborigines or a Contracting Government on behalf of aborigines, and then only when the meat and products of such whales are to be used exclusively for local

> consumption by the aborigines (IWC Schedule 2005 and subsequent years, paragraph 13(b)(2)).

Paragraph 13(b) of the current Schedule (IWC 2012b) sets catch limits for 2013 through 2018. Paragraph 13(b)(2) sets a catch limit of 744 ENP gray whales that is limited to 140 whales per year (reviewable annually by the IWC and its Scientific Committee). The catch limit (as conveyed in the Schedule) has stayed the same for the past 17 years, notwithstanding requests by the Chukotkans for more whales and notwithstanding the NMFS analysis that the ENP stock has a much higher PBR level (Subsection 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates). Also, during the past three Schedule cycles when the Makah Tribe has not been able to harvest whales, the Chukotkans have harvested them instead (Subsection 4.1.1.3, Potential Number of ENP and PCFG Whales Killed; Likelihood of Striking a WNP Whale; Likely Number of Whales Harvested). Given these considerations, we conclude that gray whales will continue to be harvested in aboriginal subsistence hunts at current or very similar levels with oversight by the IWC. We conclude that subsistence harvest of ENP gray whales at current levels, with close oversight by the IWC, is a reasonably foreseeable future action in the Chukotkan region (and possibly in the coastal portion of the Makah U&A if NMFS were to complete the actions described in 1.1.1, Summary of the Proposed Action) (Figure 5-2) that will continue to impact gray whales.

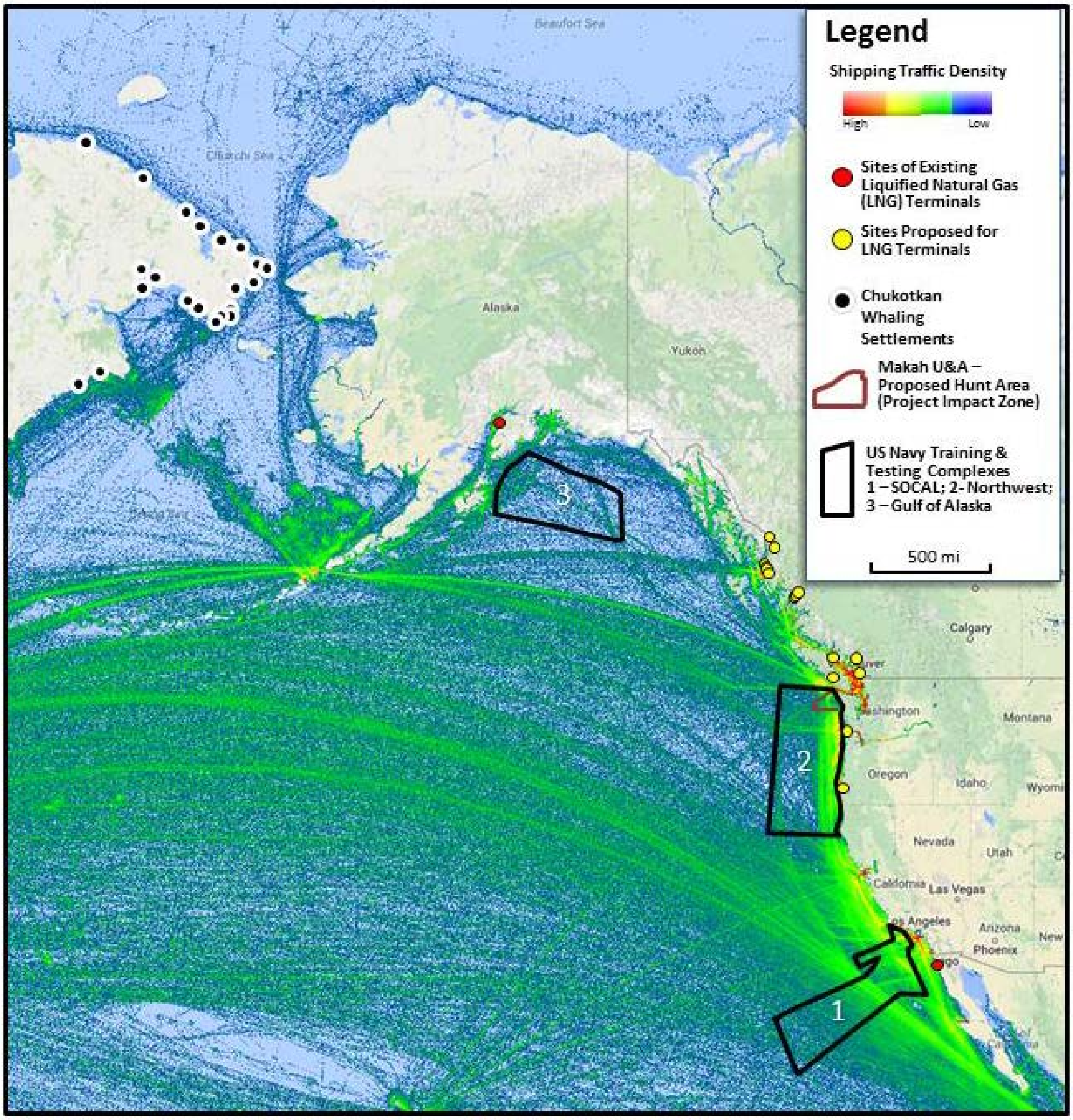

Figure 5-2. Location of the proposed hunt area relative to shipping traffic, LNG terminals, Chukotkan whaling settlements, and U.S. Navy training and testing complexes.[2]

5.1.3.2 Shipping

Details and issues related to past and present shipping effects can be found in the following subsections of this DEIS:

- 3.2.6, Spill Prevention
- 3.4.3.6.4, Oil Spills and Discharges
- 3.4.3.6.11, Climate Change and Ocean Acidification
- 3.6.3.1.4, Commercial Shipping

[2] Data layer sources: Shipping (https://www.marinetraffic.com/); LNG terminals (LNG in BC 2014; US Department of Energy 2014); Chukotkan whaling settlements (Borodin et al. 2012); US Navy Training and Testing Area (U.S. Navy 2013, 2014a, 2014b).

- 3.11.3.2.2, Marine Noise

Figure 5-2 displays the tracks of recent shipping traffic in the analysis area. Shipping traffic is concentrated in the nearshore zone used by migrating and travelling gray whales, and the highest traffic densities are associated with the following coastal ports and interior waters (south to north): Guerrero Negro (Baja Mexico); Long Beach and San Francisco Bay ports (California); Columbia River and inland ports (Oregon and Washington); Strait of Juan de Fuca and Puget Sound ports (Washington); Georgia Basin ports including Vancouver and Victoria, as well as Port Hardy and Prince Rupert (British Columbia, Canada); and Anchorage/Nikiski, Akutan/Dutch Harbor, and Nome (Alaska). Effects on gray whales from shipping include ship strikes, noise, and spills. In our most recent stock assessment report (Carretta et al. 2014) we show that for the 5-year period 2007 to 2011 the total serious injury and mortality of ENP gray whales attributed to ship strikes is 10.8 animals (including eight deaths) or 2.2 whales per year, for whales in the PCFG range and season during this same period it is 0.52 animals, or 0.1 whale per year. Additional mortality from ship strikes probably goes unreported because stranded whales may not have obvious signs of trauma or struck whales do not strand where they are observed.

The number of containers moving through major North American ports was up over 4 percent in the first half of 2014 (Journal of Commerce 2014). The projected growth of shipping into Puget Sound will increase the number of container ships traversing the Makah U&A, including the Strait of Juan de Fuca. Approximately 4,500 vessels annually traversed the Strait of Juan de Fuca from 2009 to 2011 (Subsection 3.13.3.2.2, Offshore Vessel Transits). The Washington Ports Association projects a 4 percent annual growth rate of container shipping into Puget Sound through 2025 (BST Associates 2004). A recent vessel traffic study for Puget Sound and the Washington coast projects a similar steady rise in shipping through 2030, with much of that traffic attributed to large, dry bulk freighters and container ships transiting the Strait of Juan de Fuca.[3] Container ships in the Strait are controlled by the Coast Guard's vessel separation scheme (Subsection 3.6.3.1.4, Commercial Shipping). Although none of the alternatives would allow the Makah Tribe to hunt in the Strait of Juan de Fuca portion of their U&A, some hunt-related vessel activity can be expected in that area (Subsection 1.4.2, Summary of Recent Makah Whaling – 1998 through 2007) and it would therefore be added to a volume of vessel traffic that is projected to increase in the future.

While most shipping routes are well established, it is difficult to project the future of shipping coast wide because of uncertain future fuel prices and the limits on future capacity of west coast

[3] This study was prepared in support of a May 2014 draft EIS addressing the operation of the North Wing of the BP Cherry Point Marine Terminal dock located in northern Puget Sound (U.S. Army Corps of Engineers 2014).

ports to accommodate increased volumes (White 2008). The Panama Canal is undergoing a major expansion scheduled for completion in 2016. The extra capacity through the Canal could have a significant impact on shipping routes (especially from East Asia), with some forecasts predicting at least a 6 to 8 percent reduction in shipping volume at west coast ports as vessels shift to an all-water route via the Canal (SFGate 2014). New shipping routes could also be established in the Arctic if the extent and duration of ice cover continues to decrease. However, sea ice conditions are highly variable and major uncertainties regarding the predictability and safety of navigational pathways (Wilson et al. 2004) suggest that significant investments will be needed before a trans-Arctic passage can reliably be used (Ho 2010).

Future shipping levels could also be affected by an increase in liquefied natural gas (LNG) facilities along the west coast within or adjacent to areas inhabited by gray whales. Presently, there is only an existing LNG export (liquefaction) terminal located near Kenai, Alaska, and an existing import (regasification) terminal near Ensenada, Mexico. Information compiled by the California Energy Commission (2010) indicates that at least ten LNG terminals were being considered for construction in California, Oregon, Washington, and British Columbia in recent years. The operation of such terminals would increase large tanker shipping in the analysis area and LNG tankers could encounter gray whales while transiting to and from terminals. The Federal Energy Regulatory Commission (FERC) is responsible for authorizing the siting and construction of onshore and nearshore LNG import or export facilities. As of September 2014, the U.S. Department of Energy (2014) had identified 2 proposed LNG terminals in the U.S. portion of the analysis area: an export terminal in Coos Bay, Oregon, and an import/export terminal in Astoria, Oregon. In British Columbia, there are currently 16 proposed LNG projects primarily in the vicinity of Vancouver and Prince Rupert (LNG in BC 2014) (Figure 5-2). Neither of the proposed terminals in Oregon has a projected in-service date; however, two of the Canadian terminals (Discovery in Campell River, and Woodfibre in Squamish) have projected in-service dates within the next 7 years.

It is difficult to predict the number and location of LNG facilities that will actually be built within the analysis area. In addition to a rigorous review process, many LNG projects face significant local opposition as has been witnessed in the Pacific Northwest and California (e.g., Oregon's Bradwood Landing and California's Clearwater Port projects) or are abandoned during the development stages for various reasons. Market forces will likely continue to dictate the number of facilities constructed in North America.

We conclude that shipping is a reasonably foreseeable future action that will likely increase, leading to increased impacts to gray whales (most likely resulting from vessel strikes and pollution from spills), especially from southern Alaska to Mexico, but potentially in the Arctic if shipping traffic expands into those waters.

5.1.3.3 Military Exercises

The analysis area includes waters from Russia to Mexico (Figure 5-1), which are traversed by naval vessels from many countries. Naval vessels represent a minute fraction of all vessel traffic in the analysis area and are unlikely to have more than a negligible effect on ENP gray whales when transiting (Subsection 5.1.3.2, Shipping). Military training and testing exercises, however, could affect ENP gray whales as a result of whales being exposed to explosions, projectiles, and underwater noises. Countries that may regularly engage in training and testing activities in the analysis area include the United States, Canada, Mexico, and Russia.

The U.S. Navy has operated regularly in the ENP since 1841. Most naval facilities within or adjacent to the analysis area are located in San Diego (main homeport of the Pacific Fleet) and Puget Sound (home to the third largest fleet concentration in the United States). The analysis area encompasses naval operations off the coasts of California, Oregon, Washington, and Alaska. Training and testing in the coastal waters of the ENP currently occurs primarily in three complexes that overlap with the gray whale range (Figure 5-2): Southern California Range (SOCAL) Complex,[4] Northwest Training Range Complex (Washington), and Gulf of Alaska Training Area. In addition, the Navy may conduct training and testing exercises in the coastal waters of other countries through "Rim of the Pacific" (RIMPAC) military exercises (Sorenson 2014).

Effects of past and current naval activities on gray whales are reflected in the current condition of the whales, which is described in Subsection 3.4.3, Gray Whales – Existing Conditions. Where naval exercises are expected to continue as they have in the past, we expect there would be no new or additional effects on gray whales. Although the Navy frequently modifies its testing and training activities as needed to evaluate new technologies or emerging threats, such modifications do not necessarily result in substantive changes in effects on gray whales. Regardless, NMFS actively consults with the Navy on military exercises throughout the ENP and provides biological analyses, mitigation measures, and permits as warranted to minimize take of marine mammals and ESA-listed species. The discussion below addresses the three Navy complexes within our analysis area for cumulative impact analysis.

<u>SOCAL Range Complex</u>: The Navy's SOCAL Range Complex is situated between Dana Point and San Diego, California, and extends more than 600 nm (1,111 km) southwest into the Pacific

[4] The SOCAL Range Complex is one of three complexes in the larger Hawaii-Southern California Training and Testing Study Area.

Ocean (Figure 5-2), encompassing 120,000 square nm (412,000 square km) of sea space. This area overlaps with the southern portion of the gray whale migration corridor.

Pursuant to a final EIS issued in December 2013 (U.S. Navy 2013), the Navy is currently conducting training and testing in the SOCAL Range Complex over a 5-year period (2013 to 2018) for the following activities: anti-air warfare, amphibious warfare, strike warfare, anti-surface warfare, anti-submarine warfare, electronic warfare, mine warfare, and naval special warfare. Details regarding each activity can be found in the Navy's final EIS. In a 2013 Biological Opinion (NMFS 2013d), we reviewed the Navy's activities and determined that takes of marine mammals would likely result from exposure to sound or pressure waves in the water and interactions with vessels. (There is also a chance that bottom feeders like gray whales could ingest small fragments of expended ordnance used in certain training exercises; however, they typically feed in waters shallower than those used in naval exercises). We further concluded that we do not expect any stress responses for gray whales to continue long enough to have fitness consequences for individual animals because these whales are likely to have energy reserves sufficient to meet the demands of their normal behavioral patterns and the additional demands of any stress responses. Therefore, we would not expect gray whales to experience reductions in their annual or lifetime reproductive success as a result of their response to being exposed to active sonar during the training and testing the U.S. Navy plans to conduct in the SOCAL Complex.

In our Biological Opinion (NMFS 2013d), we also noted that the estimates of WNP gray whale exposures to training and testing activities are probably an over-estimate of the actual exposures even if they represent the best estimate available. The few WNP gray whales that may be exposed to naval activities in the SOCAL Complex would only be exposed periodically or episodically, if at all (especially during the summer months when they would be expected to be foraging in WNP waters). We concluded that the Navy's training and testing activities are not likely to adversely affect the population dynamics, behavioral ecology, and social dynamics of individual WNP gray whales in ways or to a degree that would reduce their fitness. We also noted that an action that is not likely to reduce the fitness of individual whales would not be likely to reduce the viability of the populations those individual whales represent (that is, we would not expect reductions in the reproduction, numbers, or distribution of those populations). As a result, the activities the U.S. Navy plans to conduct in the SOCAL Complex would not appreciably reduce the WNP gray whales' likelihood of surviving and recovering in the wild.

In December 2013, we issued MMPA letters of authorization (NMFS 2013d) to the Navy for training and testing activities in the SOCAL Complex during the 5-year period from 2013 to 2018 that allow for the following amounts of harassment[5]:

- ENP gray whales = 15 Level A harassments and 60,590 Level B harassments
- WNP gray whales = 0 Level A harassments and 60 Level B harassments

In addition, naval activities could result in up to 15 large whale injuries or mortalities or serious injuries (no more than six in any given year) from vessel strikes, but no more than three of these can be WNP gray whales in any given year. As part of our authorization, the Navy is also required to invoke various mitigation measures, including lookouts, mitigation zones, and a stranding response plan.

Northwest Training Range Complex (NWTR Complex): The Navy's NWTR Complex includes an area extending 250 nm (463 km) westward from the coasts of Washington, Oregon, and Northern California and encompassing 122,440 square nm (420 square km) (Figure 5-2) (U.S. Navy 2014a). This area overlaps with portions of the ENP migration corridor, the PCFG range, and the coastal portion of the Makah U&A where the Tribe proposes to hunt gray whales.

Pursuant to a final EIS issued in December 2010 (U.S. Navy 2010), the Navy is currently conducting training and testing in the NWTR Range Complex for an indefinite period of time but will review its compliance with NEPA and other laws approximately every 5 years for substantive changes and to update/renew permits from regulatory agencies as necessary. The Navy EIS evaluates a number of activities for the period 2012 to 2015 related to training, testing, research, development, and evaluation. Details regarding each activity can be found in the Navy's final EIS.

The Navy recently proposed changes to its activities in the area and produced a draft EIS (U.S. Navy 2014a) describing proposed changes in the number of training and testing activities in waters frequented by gray whales:

- Increasing the number of rounds fired in small- and medium-caliber gunnery exercises conducted by the U.S. Coast Guard

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[5] Under the 1994 Amendments to the MMPA, harassment is statutorily defined as any act of pursuit, torment, or annoyance which — (Level A Harassment) has the potential to injure a marine mammal or marine mammal stock in the wild, or (Level B Harassment) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

- Terminating exercises that use explosive weapons such as gunnery rounds, missiles, bombs, and torpedoes to sink full-size ship targets
- Increasing the duration and power of surface ship sonar activity
- Increasing the number of electronic warfare and mine detection training events
- Conducting new tests of torpedoes, countermeasures, buoys, flares, and anti-submarine warfare mission packages

Navy acoustic modeling predicts there would be a highly variable number of events per year (from a few to several thousand) where gray whales could be exposed to sound that may result in a short-term (temporary) change in hearing because of stress on auditory tissues from exposure to high-intensity sound. Recovery may occur within minutes, hours, or days and is not considered injurious. Therefore, the Navy concludes that long-term consequences would not be expected on individual gray whales or the ENP and WNP stocks overall. The Navy also notes that it does not anticipate encountering WNP gray whales during training or testing activities, as their presence is very rare in the study area.

In our 2012 Biological Opinion related to the naval activities in the NWTR Complex (NMFS 2012c), we determined that takes of marine mammals would likely result from exposure to sound or pressure waves in the water or interactions with vessels, projectiles, or expended materials. We did not specifically analyze gray whales in that Biological Opinion because at the time recent sightings of WNP gray whales in the ENP were still being investigated to determine whether or not those sightings were anomalies (refer to Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements). However, we did analyze other ESA-listed baleen whales, including humpback, fin, blue, and sei whales. Our analysis did not identify situations where the proposed training activities are likely to indirectly affect ESA-listed species by disrupting marine food chains or by adversely affecting the predators, competitors, or forage base of endangered or threatened species. In addition, we concluded that endangered or threatened individuals that are likely to be exposed to the Navy's activities in the NWTR Complex are not likely to experience reductions in fitness. In light of the expected impacts on other whale species analyzed in that Biological Opinion, we believe it is reasonable to conclude that any stress responses or disruptions of normal behavior patterns of gray whales would not continue long enough to have fitness consequences for individual animals because these whales are likely to have energy reserves sufficient to meet the demands of their normal behavioral patterns and the additional demands of any stress responses. Therefore, we would not expect gray whales to experience reductions in their annual or lifetime reproductive success as a result of their response to being exposed to naval training activities in the NWTR Complex. Also, given the offshore location of most of the naval activities, we do not expect bottom feeders like gray whales to ingest small fragments of expended ordnance used in certain training exercises because they would typically feed in waters shallower than those used in naval exercises. The few WNP gray whales that may be exposed to naval activities in the NWTR Complex would only be exposed periodically or episodically, if at all (especially during the summer months when they would be expected to be foraging in WNP waters).

In October 2012, we issued an MMPA letter of authorization (NMFS 2012c) to the Navy for training activities in the NWTR Complex during the 3-year period November 12, 2012 to November 9, 2015 that allows for no Level A harassments and four Level B harassments of gray whales (but with no distinction between WNP and ENP whales). As part of our authorization, the Navy is also required to invoke various mitigation measures, including personnel training and lookouts/surveillance (including visual and aural monitoring). The Navy has prepared a new draft EIS to evaluate future training and testing activities in the NWTR Complex from 2015 through 2020 (U.S. Navy 2014a). Both ENP and WNP gray whales are included in that draft EIS, but it is too early to determine whether we would issue a subsequent letter of authorization for either gray whale stock.

<u>Gulf of Alaska Range Complex (GOA Complex)</u>: The Navy's GOA Complex includes a Temporary Maritime Activities Area (TMAA) that is established in conjunction with the Federal Aviation Administration (FAA) for up to 14 days per year to support the Navy's "Northern Edge" training exercise. The TMAA is a surface, undersea space, and airspace maneuver area within the GOA for ships, submarines, and aircraft to conduct required training activities. As depicted in Figure 5-2, the TMAA is a roughly rectangular area oriented from northwest to southeast, approximately 300 nm (556 km) in length by 150 nm (278 km) in width, located south of Prince William Sound and east of Kodiak Island. With the exception of Cape Cleare on Montague Island located over 12 nm (22 km) from the northern point of the TMAA, the nearest shoreline (Kenai Peninsula) is located approximately 24 nm (44 km) north of the TMAA's northern boundary. This area overlaps with the northern portion of the gray whale migration corridor and is in the vicinity of areas where some gray whales are known to feed during the summer (Subsection 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem).

The Navy issued a final EIS in March 2011 (U.S. Navy 2011) that analyzes the potential environmental effects that may result from 1) ongoing naval training activities (one joint force exercise occurring over a maximum time period of 14 days during summer months [April through October]) and 2) proposed naval training activities associated with conducting two large-scale joint force exercises, including anti-submarine warfare activities and the use of active sonar. These exercises would each last up to 21 days during a focused exercise period; outside of that activity period (i.e., during the other 46 to 49 weeks of the year) the Navy does not train within the TMAA or other areas of the GOA Complex. Activities associated with these exercises include: anti-air warfare, strike warfare, anti-surface warfare, anti-submarine warfare, electronic warfare, mine warfare, and naval special warfare. Details regarding each activity can be found in the Navy's final EIS.

In our Biological Opinion related to the Navy's activities in the GOA Complex (NMFS 2011), we determined that takes of marine mammals would likely result from exposure to sound or pressure waves in the water and interactions with vessels. We did not specifically analyze gray whales in that Biological Opinion because at the time the recent sighting of a WNP gray whale in the ENP was still being investigated to determine whether or not it was an anomaly (refer to Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements). However, we did analyze other ESA-listed baleen whales, including humpback, fin, blue, sei, minke, and North Pacific right whales. Our analysis did not identify situations where the proposed training activities are likely to indirectly affect ESA-listed species by disrupting marine food chains or by adversely affecting the predators, competitors, or forage base of endangered or threatened species. In light of the expected impacts on other whale species analyzed in that Biological Opinion, we believe it is reasonable to conclude that any stress responses or disruptions of normal behavior patterns of gray whales would not continue long enough to have fitness consequences for individual animals because these whales are likely to have energy reserves sufficient to meet the demands of their normal behavioral patterns and the additional demands of any stress responses. Therefore, we would not expect gray whales to experience reductions in their annual or lifetime reproductive success as a result of their response to being exposed to naval training activities in the GOA Complex. Also, given the offshore location of the GOA Complex, we do not expect bottom feeders like gray whales to ingest small fragments of expended ordnance used in certain training exercises because they would typically feed in waters shallower than those used in naval exercises. The few WNP gray whales that may be exposed to naval activities in the GOA Complex would only be exposed periodically or episodically, if at all (especially during the summer months when they would be expected to be foraging in the WNP).

In May 2013, we issued an MMPA letter of authorization (NMFS 2013e) to the Navy for training activities in the GOA Complex during the 3-year period May 16, 2013 to May 4, 2016 that allows for no Level A harassments and 388 Level B harassments of gray whales (but with no distinction between WNP and ENP whales). As part of our authorization, the Navy is also required to invoke various mitigation measures, including personnel training and lookouts/surveillance (including visual and aural monitoring). The Navy has prepared a new draft supplemental EIS to evaluate future training activities in the GOA Complex from 2016 through 2021 (U.S. Navy 2014b). Both

ENP and WNP gray whales are included in that draft EIS, but it is too early to determine whether we would issue a subsequent letter of authorization for either gray whale stock.

In Canada, Maritime Forces Pacific (MARPAC) is responsible for the fleet training and operational readiness of the Royal Canadian Navy in the Pacific Ocean. The MARPAC headquarters and home port is located in Esquimalt at the southern tip of Vancouver Island on the Strait of Juan de Fuca. We could not find information detailing the types of training or testing that MARPAC conducts in our analysis area. However, news accounts in 2012 reported that the Royal Canadian Navy had been conducting sonar and small underwater explosive activities off southern Vancouver Island and these were implicated (but eventually cleared) in the death of a killer whale that washed ashore along the outer Washington Coast (Vancouver Sun 2012; Vancouver Sun 2014). Statements made at the time by the Royal Canadian Navy underscored that all vessels are to follow a Marine Mammal Mitigation Policy when using sonar and detonating charges, "which includes (but is not limited to) a visual surveillance of the area by watch officers and lookouts, monitoring of passive systems as a means to detect marine mammals as well as the use of a mitigation zone which will cease operations if marine mammals come within a certain range" (Vancouver Sun 2012). A review of marine mammal mitigation measures used by various countries when conducting naval exercises noted that the Royal Canadian Navy designates a 1 nautical mile (1.85 km) 'safety zone' within which real-time mitigation measures are implemented if baleen whales are detected (Dolman et al. 2009).

In part because of rapidly changing Arctic ice conditions, the U.S. Navy recently produced an "Arctic Roadmap" report for 2014 to 2030 (U.S. Navy 2014c) that forecasts the following:

> In the coming decades, the Arctic Ocean will be increasingly accessible and more broadly used by Arctic and non-Arctic nations seeking the Region's abundant resources and trade routes. Due to the significant retreat of sea ice, previously unreachable areas have started to open for maritime use several weeks each year. The predicted rise in oil and gas development, fishing, tourism, and mineral mining could alter the Region's strategic importance as Arctic and non-Arctic nations make investments.

Although this report does not identify specific areas and training or testing exercises, it does acknowledge that the Navy will need to conduct such exercises in harsh Arctic conditions, likely in conjunction with other countries such as Canada. The report also underscores that at-sea training and testing activities will need to be in compliance with environmental laws such as the MMPA, ESA, and NEPA.

Other portions of the analysis area in the Arctic are under the jurisdiction of the Russian Federation. While we were not able to obtain details on that country's military-related plans in waters occupied by gray whales, a recent "Russian Federation Policy for the Arctic to 2020" (2009) notes that two of the strategic priorities in the Arctic are:

- Military security—defense and protection of the state border lying in the Arctic zone of the Russian Federation, including maintenance of a necessary fighting potential of the Armed Forces of the Russian Federation.
- Environmental security—preservation and maintenance of the Arctic environment, especially with respect to ecological consequences of increasing economic activities and global changes of climate.

We were also not able to obtain information about specific military training activities or plans by the Mexican Navy. However, the U.S. has recently been expanding assistance to training the Mexican Navy and other armed forces, and Mexico regularly participates in "Rim of the Pacific" (RIMPAC) military exercises with the U.S. and other countries' navies (Sorenson 2014). Most Mexican Navy exercises in the range of gray whales seem to focus on using small naval ships for search and rescue operations or drug interdiction (Young 2011).

We conclude that military exercises are a reasonably foreseeable future action that will continue to impact gray whales (most likely the result of vessel strikes and noise impacts), especially in the localized but large testing and training complexes in the ENP. Most military exercises are likely to continue as they have in the past, with some unknown but usually minimal variation in intensity and equipment/technology, and activities may increase in the Arctic.

5.1.3.4 Fisheries

Details and issues related to past and present fisheries effects can be found in the following subsections of this DEIS:

- 3.4.3.1.7, Strandings
- 3.4.3.6.9, Incidental Catch in Commercial Fisheries

Commercial fisheries have been harvesting a variety of finfish and shellfish along the west coast since the 1800s (e.g., Alaska Marine Conservation Council 2005; Dahlstrom and Wild 1983). Most gray whale entanglements seem to be associated with west coast crab and shrimp fisheries that typically employ a cage-like "pot" set on the ocean bottom and tethered by rope to a floating buoy on the surface. Dungeness crab are the primary species targeted in the Pacific Northwest and commercial crab fishing areas occupy a nearly continuous band of nearshore waters from Eureka, California north to Destruction Island off the central Washington coast (Johnson et al. 1986). Over 1,200 persons are engaged in this fishery in these three states. Canadian fishermen also harvest Dungeness crab and the Canada Department of Fisheries and Oceans (DFO; 2013) reports that 27 licenses were issued and 350 traps deployed in 2010 to 2012 off the west coast of Vancouver Island (Area E) (DFO 2012b). In Alaska, there are seven crab species of commercial importance, with fisheries extending from the Northern Bering Sea to Southeast Alaska (Alaska Department of Fish and Game 2014). King and snow crab are the primary species harvested, with the latter making up nearly 75 percent of the Alaska crab landings in 2012 (NMFS 2012d). In the most recent ENP gray whale stock assessment report (Carretta et al. 2014), gray whales were reported with rope and crab pot gear wrapped around or cutting into their body (often the caudal peduncle, flipper, or mouth). Some animals were free swimming while others were dead or in a poor, emaciated condition.

In addition to encounters with crab fisheries, other fisheries known to entangle gray whales include longline, gillnet, and seine fisheries, with the latter two net fisheries accounting for most mortality from these gear types (Baird et al. 2002). Some employ long nets (e.g., drift gillnets) that hang for hours in the water column and can ensnare gray whales. The most recent ENP gray whale stock assessment report (Carretta et al. 2014) records two instances between 2007 and 2011 where gray whales were observed entangled in gillnet gear within the PCFG range and season. One animal was re-sighted 4 years later and it had shed all the gear and seemed in good health. As described in Subsection 3.4.3.6.9, Incidental Catch in Commercial Fisheries, NMFS observers monitoring the Makah tribal set gillnet fishery from 1990 to 1998 and in 2000, reported one gray whale taken in 1990 and one in 1995. One gray whale was entangled in a set gillnet during the 1995 fishery and was used by the Tribe after it died (NMFS 1995), while another whale entangled in the 1996 fishery was released alive (Hill and DeMaster 1998). Another gray whale was found entangled in a tribal set gillnet in 2009 and swam away during disentanglement attempts (Scordino and Mate 2011). In recent years, this set gillnet fishery has been reduced considerably and is currently restricted to the Strait of Juan de Fuca (Makah Fisheries Management 2012). NMFS observers monitoring the California/Oregon thresher shark/swordfish drift gillnet fishery from 2006 to 2011 and the California set gillnet halibut fishery in 2006, 2007, and 2010 did not observe any entangled gray whales, but there have been recent sightings of free-swimming gray whales entangled in gillnets (Carretta et al. 2014).

On March 14, 2014 we published an updated “List of Fisheries” (79 Fed. Reg. 14418) which reviews and classifies commercial fisheries into one of three categories under the MMPA based on the level of mortality and serious injury of marine mammals that occurs incidental to each fishery:

- Category I = frequent incidental mortality and serious injury of marine mammals
- Category II = occasional incidental mortality and serious injury of marine mammals

- Category III = a remote likelihood or no known incidental mortality and serious injury of marine mammals

Gray whales are not identified as an affected species in any Category I fisheries but are identified in the following eight Category II fisheries:

- California: Dungeness crab pot and spot prawn pot
- Oregon: Dungeness crab pot
- Washington: Dungeness crab pot
- Alaska: Yakutat salmon set gillnet; Bristol Bay drift gillnet; Bristol Bay set gillnet; and Bering Sea, Aleutian Islands flatfish trawl

Figure 5-3 shows the general location of these Category II fisheries. In the vicinity of the project area, recent research aimed at reducing fisheries impacts on large whales has had notable success in identifying and removing derelict pot gear, especially buoy lines (NMFS 2014b).

In Mexico, the coastal waters off Baja California and the Gulf of California account for 50 to 70 percent of annual fisheries production (Organization for Economic Cooperation and Development 2008). Urban-Ramirez et al. (2003) reported six incidents of gray whale entanglements in Mexico involving passive fishing gear, including gillnet and pot gear. These authors noted that data on gray whale entanglements in Russia are not available, and we were not able to find information regarding such entanglements in the Russian portion of the ENP range.

We conclude that fisheries are a reasonably foreseeable future action that will continue to affect gray whales (most likely the result of vessel strikes and gear entanglements) throughout their range in the ENP.

5.1.3.5 Tourism

Tourism, in particular whale-watching, can have a wide range of effects on gray whales, including increased public awareness, commercial revenues, and vessel and noise related impacts. Details and issues related to past and present whale-watching/tourism effects can be found in the following subsections of this DEIS:

- 3.4.3.5.2, Whale Response to Being Pursued
- 3.4.3.6.5, Offshore Activities and Underwater Noise
- 3.4.3.6.6, Vessel Interactions
- 3.4.3.6.7, Activities Occurring in the Mexican Portion of the Range
- 3.5.3.3.4, Marine Mammals and Underwater Noise
- 3.6.3.3.2, Commercial Value of Whales

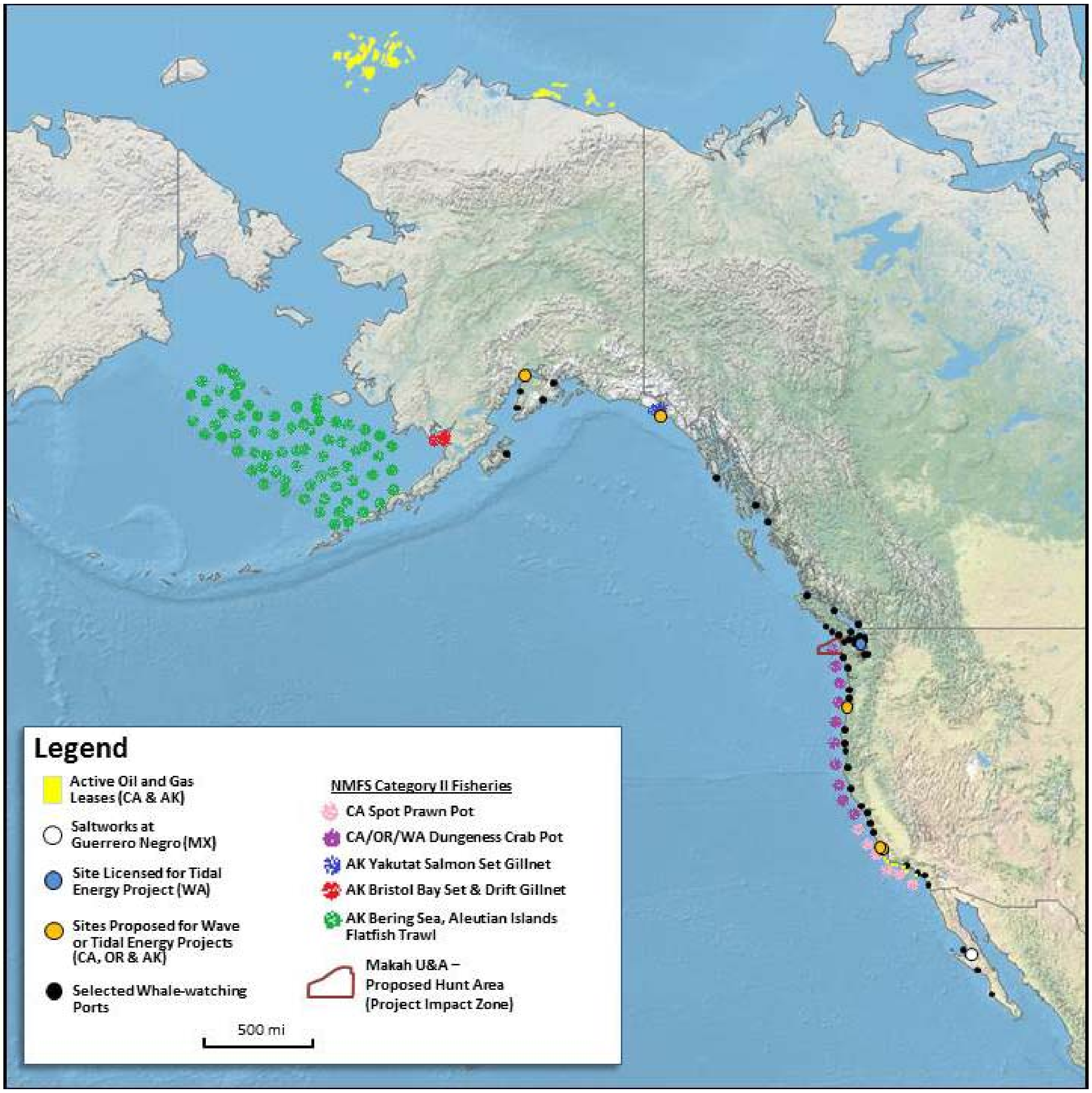

Figure 5-3. Location of the proposed hunt area relative to Category II fisheries monitored by NMFS, active oil and gas leases, wave and tidal energy projects, Mexican saltworks, and selected ports for whale watching tours.[6]

As described in Subsection 3.6.3.3.2, Commercial Value of Whales, whale watching is an important tourist activity throughout much of the range of gray whales, especially in the southern/winter portion of the ENP (Figure 5-3). In a study of worldwide whale watching trends, O'Connor et al. (2009) found that, in the ENP, the number of whale watchers had increased from roughly 2.8 million watchers in 1998 to over 3.3 million in 2008. That study also reported that the number of whale watch operators in the ENP (excluding Mexico, for which 1998 data were

[6] Data layer sources: Liquefied Natural Gas Sites (FERC 2014a; LNG in BC 2014); Shipping (https://www.marinetraffic.com/); Wave and Tidal Energy Sites (FERC 2014b); Whale Watching Ports (Alaska Whale Tours 2014; BritishColumbia.com 2012; HelloBC 2014; GoNorthwest 2014; Oregon Coast Visitors Association 2014; Pacific Whale Watch Association 2014; Tofino-bc.com 2012; Trekaroo 2014).

lacking) had increased from 214 to 233 during the same time period. Summarized below is the average annual growth rate (AAGR) of whale watchers reported in that study for each country/state in the ENP, as well as major ports/locales that we could identify with boat-based operations for watching gray whales:

- Mexico: +5.8 percent AAGR (Bahia Magdalena Lagoon complex, Laguna San Ignacio, and Laguna Ojo de Liebre).
- California: -2.5 percent AAGR (Bodega Bay, Crescent City, Eureka, Fort Bragg, Half Moon Bay, Los Angeles vicinity, Monterey, Morro Bay, San Diego, San Francisco, and Santa Barbara).
- Oregon: +7.1 percent AAGR (Brookings, Charleston, Depoe Bay, Garibaldi, and Newport).
- Washington: +3.0 percent AAGR (Anacortes, Bellingham, Friday Harbor, La Push, Neah Bay, Port Angeles, Port Townsend, Seattle, Vashon Island, and Westport).
- British Columbia: +4.2 percent AAGR (Campbell River, Duncan, Port Hardy, Port Renfrew, Prince Rupert, Sidney, Sooke, Tofino, Ucluelet, Vancouver, and Victoria.
- Alaska: +21 percent AAGR (Homer, Kenai, Ketchikan, Kodiak, Seward, Sitka, and Whittier).

Whale watching in Mexico began in the 1970s and has turned into an active and diverse industry, spreading out from the lagoons to southern and eastern Baja and the mainland coast (Hoyt and Iñíguez 2008). The majority of whale watching tours in Mexico take place using small boats in the winter when gray whales congregate in and near lagoons to breed and give birth. Operators in the northern portion of the analysis area (especially the interior waters of the Georgia basin) typically focus on trips to view killer whales, but they also advertise opportunities for viewing other wildlife, including gray whales. Charters focusing on migrating gray whales typically are offered in the spring, while tours to see locally feeding gray whales during the summer feeding period are available from California to Alaska.

We found very little information regarding active whale-watching tours in eastern Russia. O'Connor et al. (2009) noted that there are a few operators offering general nature/ecotour cruises, but data are very limited in this remote region and operations seem to be focused near Kamchatka and the Kuril and Commander Islands in the WNP. Hoyt (2006) recently prepared a guide for companies, conservation groups, and individuals wanting to promote or set up marine ecotours in Russia. That report identifies gray whales as the most common large whale in the Arctic waters of eastern Russian during the summer and autumn. It also goes on to note that there are currently no official marine mammal or whale watch regulations in Russian legislation.

Although whale watching has grown within the analysis area during the past two decades and may continue to grow, some regions have seen a decline or been characterized as "mature" (e.g., California and Oregon), with operators competing for a fixed number of whale watching tourists (O'Connor et al. 2009). If interest in whale watching continues to grow then the number of whale watch operators may also increase. However, the number of operators (in contrast to whale watcher trends reported above) in some regions in the analysis area did not grow (British Columbia) or declined in number (Oregon) between 1998 and 2008 (O'Connor et al. 2009), so it is difficult to predict how much whale watching might grow in the future.

As described previously, gray whales are known to change their behavior when pursued by whale-watching boats, including changing course and altering their swimming speed and respiratory patterns (Subsections 3.4.3.5.2, Whale Response to Being Pursued, and 3.4.3.6.6, Vessel Interactions). Cow-calf pairs of gray whales are considered more sensitive to disturbance by whale-watching vessels than other age or sex classes. In general, scientists remain cautious about drawing conclusions regarding the magnitude of the effects of whale watching on gray whales (3.4.3.6.6, Vessel Interactions). Nonetheless, the activity of commercial whale-watching vessels and private recreational boats has raised concerns about its effect on gray whales. In response to these concerns, regulations or guidelines are in place to minimize disturbance by vessels in Mexico, the United States, and Canada. For example, the Mexican government has applied whale-watching regulations to commercial operators since 1997 and there are currently regulations governing the numbers of boats and methods of approach for specific whale-watching areas in the Baja lagoons. In Washington and British Columbia, NMFS and conservation organizations in the United States have teamed up with the Canadian government and conservation organizations to adopt 'Be Whale Wise' guidelines for vessels, kayaks, and other crafts used for watching whales. The guidelines, among other things, recommend that vessels keep a 100-yard (91-meter) buffer between the vessel and the whale, and recommend a slow approach speed of 7 knots within 400 yards (366 meters) of whales (refer to Subsection 3.4.3.6.6, Vessel Interactions).

We conclude that whale-based tourism is a reasonably foreseeable future action that will continue to impact gray whales (most likely resulting from vessel strikes and behavioral changes) throughout their range in the ENP.

5.1.3.6 Marine Energy and Coastal Development Projects

Past, present, and reasonably foreseeable future oil and gas exploration and development occur near the southern and northern extremes of the range of ENP gray whales. Potential effects include vessel strikes, noise, and pollution. Past and present effects on ENP gray whales are described in Subsection 3.4.3.6.4, Oil Spills and Discharges, Subsection 3.4.3.6.5, Offshore Activities and Underwater Noise, and Subsection 3.4.3.6.7, Activities Occurring in the Mexican Portion of the Range. The Bureau of Ocean Energy Management, Regulation and Enforcement (BOEM; formerly the Minerals Management Service) leases mineral rights to submerged lands on the Outer Continental Shelf (OCS). These rights are conveyed by contracts referred to as leases. Each lease covers an area that is no more than 5,760 acres and is generally a square measuring 3 miles by 3 miles (4.8 km by 4.8 km). Under a lease, a company has the right to apply for permits to explore and develop the mineral resources within that area. Before approving the permits, BOEM reviews all applications to ensure that the activities will be conducted in a safe and environmentally sound manner and that the interests of key stakeholders are effectively addressed. The BOEM regularly updates its leasing plans via a Five Year Program that consists of a schedule of oil and gas lease sales indicating the size, timing, and location of proposed leasing activity the Secretary determines will best meet the country's national energy needs for the 5-year period following its approval. The most recent leasing program covers the period of 2012 to 2017, and a new program is under development for the years 2017 to 2022 (79 Fed. Reg. 34349, June 16, 2014).

As of May 2012, the Pacific OCS Region of the BOEM had 43 active leases encompassing 217,669 acres that are all offshore of southern California. As a result of congressional moratoria and, later, presidential action, no new lease sales have been held in the Pacific region since 1984. Toward the northern end of the gray whale's range, there were 14 active leases in the Alaska region, with approximately 72,491 square miles (187,751 square km) under lease in the Chukchi and Beaufort seas (although approximately three-quarters of leased Alaska acreage is subject to litigation challenging a Chukchi Sea lease sale). Active leases are expected to result in continued development of offshore production facilities and pipeline, drilling activities, and seismic programs, as well as transportation and barging. While the disposition of leases purchased in recent sales is highly speculative at this time, it is probable that at least some seismic exploration and possibly some exploratory drilling could take place during the next few years.

Large areas in the ENP are not eligible for oil and gas development. In March 2010, President Obama withdrew the North Aleutian Basin from consideration for oil and gas development through 2017, noting that Alaska's Bristol Bay was an area "too special to drill" (U.S. Department of Interior 2010). Accordingly, the area around Bristol Bay, used regularly by gray whales during their migration and often used in the summer for feeding, will be protected for the foreseeable future. In addition, the president announced a strategy that excludes oil and gas exploration or development in areas near California, Oregon, and Washington. Off the Pacific coast of Canada, a federal moratorium on offshore oil activities in the Pacific Ocean has precluded any oil and gas production activities, and we found no evidence of offshore oil and gas development off the Pacific coast of Mexico. Recent legislation regarding Mexican energy reform (Reuters 2014) could allow foreign and private companies to compete for offshore oil and gas fields; however, production fields are currently concentrated in the Gulf of Mexico (U.S. Energy Information Administration 2014).

Also, NMFS has conducted extensive ESA section 7 consultations with BOEM regarding oil and gas leasing action on the Alaska OCS, none of which has resulted in a determination that OCS oil and gas activities were likely to jeopardize the continued existence of any listed species, including baleen whales, or destroy or adversely modify critical habitat. Since the delisting of ENP gray whales in 1994, gray whales (including endangered WNP gray whales) have not been included in ESA section 7 consultations (and have only recently been included as a result of scientists detecting animals moving between the WNP and ENP) (Subsection 3.4.3.2.2, WNP Seasonal Distribution, Migration, and Movements). It is likely, however, that the effects on gray whales would be similar to those on ESA-listed baleen whales. Accidental spills can be expected to have minor to moderate impacts that would depend on the location, timing, and volume of spills.

In the Mexican portion of the analysis area, mining for minerals (such as copper, manganese, gypsum, cobalt, silica, and phosphorus) peaked in the last century in places like Santa Rosalia, creating soil erosion, contamination, pollution, and litter in the ocean. Large mining companies have since abandoned these sites, and the town is in economic decline (ParksWatch 2004). The largest saltworks in the world is, however, still operating at Guerrero Negro (Figure 5-3), where approximately 8 million tons (7.26 million metric tons) per year is extracted from the ocean through evaporation (ParksWatch 2004). The main threat posed by salt mining is the byproducts created by high salt concentrations (Geo-Mexico 2012). Plans to expand industrial salt extraction by establishing a plant on the shores of San Ignacio Lagoon met with strong international and national protest, and in March 2000, the government of Mexico cancelled the project. Conservation agreements negotiated between the Laguna San Ignacio Conservation Alliance and communal landowners have since placed 120,000 acres of land around the lagoon in a private land trust, and more agreements are anticipated (Sullivan 2006). Thus, while the local people fish and provide ecotourism and whale-watching, it is reasonable to assume that the area will remain a sanctuary for wintering gray whales (Sullivan 2006). Given that, as well as the continued use of Guerrero Negro and adjacent lagoons by gray whales, the overall stable population of ENP gray whales, and the lack of any evidence indicating that gray whales are affected by the existing saltworks, we do not expect this mining operation to have effects that would inform our cumulative impact analysis.

During the past two decades there has been growing interest in developing sites to explore wave and tidal energy technologies along the West Coast, especially along Oregon and Washington where wave energy potential is the highest in the lower 48 states (Bedard 2005). Potential effects include entanglements, collisions with equipment, and obstruction of migration routes. Past and present effects on gray whales are described in Subsection 3.4.3.6.10, Marine Energy Projects. Although a wave energy project that was proposed for Makah Bay (i.e., within the proposed hunt area) has been withdrawn, there are continuing efforts to develop marine energy projects elsewhere along the Pacific coast (Figure 5-3), including the following:

<u>Mexico</u>

- A 3 megawatt pilot project in Rosarito was scheduled for operation in 2013, but it is unclear whether the project will be developed (Ocean Energy Systems 2013).

<u>California</u>

- San Onofre Ocean Wave Electricity Generation Electricity Farm (Preliminary Permit pending)
- Purisima Point Wave Park (preliminary permit pending)
- Morro Bay Wave Park (preliminary permit pending)
- Point Estero Wave Park (preliminary permit pending)
- Estero Bay Wave Park (preliminary permit pending)

<u>Oregon</u>

- Reedsport OPT Wave Park Project (license issued but the project was recently abandoned)
- Pacific Marine Energy Test Center South Energy Test Site Wave Test Center (pre-filing for license)

<u>Washington</u>

- Admiralty Inlet Tidal Energy Project (pilot license issued, but the project is likely to be abandoned)

<u>Alaska</u>

- East Foreland Tidal Energy Project, Cook Inlet (preliminary permit issued)

At this time, most of the U.S. projects are in the preliminary stages of study and design, and it is difficult to predict how many will ultimately be deployed and in what configuration. Similarly, although some areas along the coast of Vancouver Island have potentially suitable sites for marine energy projects (e.g., nearshore waters off Ucluelet) (Cornett and Zhang 2008; Kim et al. 2012), economic and regulatory obstacles have limited or stalled project planning (Bennett 2012;

Marine Renewables Canada 2013). We found information for only two exploratory projects in British Columbia: one involving a small tidal turbine near the southern tip of Vancouver Island at Race Rocks (deployed during 2006 to 2011 but now removed from operation) and another small, tidal power demonstration project in a narrow causeway at Canoe Pass near Campbell River on the east side of Vancouver Island (Marine Renewables Canada 2013). Also, we did not identify any marine energy projects in the Russian portion of our analysis area and, as noted above, it is unclear whether Mexico's Rosarito project will be developed. Therefore, we conclude that impacts from wave and tidal energy projects are too speculative to inform a cumulative impact analysis.

In addition to the above activities, there has been growing interest in developing LNG terminals in coastal areas within the ENP. Several issues regarding impacts on whales have been identified with the construction and operation of LNG terminals (impacts resulting from LNG shipping traffic are addressed in Subsection 5.1.3.2, Shipping). Leaks, spills, explosions, and release of contaminants could impair water quality or cause physical harm to whales. Dredging and filling associated with terminal construction and maintenance could have impacts on benthic habitat and prey. Additionally, noise associated with terminal construction and operation could disturb whales in the vicinity of the terminal. Recent assessments identify an array of mitigation measures available to address such impacts, including limiting construction to times when species are absent from the area, re-contouring bottom sediments so that benthic communities can re-establish quickly, monitoring acoustic impacts for several years (to determine if terminal areas are being avoided by whales), and frequent reporting (NMFS 2008c). As noted in Subsection 5.1.3.2, Shipping, it is difficult to predict the number and location of LNG facilities that will actually be built within the analysis area, and we conclude that impacts from the development of LNG terminals are too speculative to inform a cumulative impact analysis.

In summary, we conclude that marine energy and coastal development projects are reasonably foreseeable future actions that could impact gray whales in localized areas of their range in the ENP. However, it is speculative to predict the likely extent or impacts from most of these types of projects. Oil and gas exploration and development are the most likely activities, but impacts would depend on the location, timing, and magnitude of disturbances (e.g., construction noise or accidental oil spills).

5.1.3.7 Scientific Research

Explorers have studied the oceans since ancient times and modern scientific studies of the ocean and marine life are common, ongoing, and expected to continue throughout the analysis area. Research on gray whales in particular has been a scientific pursuit since the 1800s and has helped make the species one of the most well-known animals—and conservation success stories—in the world (Jones and Swartz 1984). Researchers often use ships and boats to investigate a wide range of scientific issues, from large-scale programs monitoring marine productivity to site-specific studies cataloging marine mammal use of particular habitats. Studies are conducted by numerous federal, state, tribal, academic, and private researchers and can vary considerably in terms of location and duration in the analysis area depending on available funding and research priorities. Some studies target gray whales and other marine mammals and use sophisticated research vessels to explore large expanses of the analysis area on a regular basis. For example, the NMFS Southwest Fisheries Science Center (SWFSC) is responsible for monitoring and estimating abundance of all cetacean species (whales, dolphins, and porpoises) in the California Current Ecosystem off the U.S. west coast and has been conducting cetacean assessment cruises off the U.S. west coast since 1979 (NMFS 2014c). Surveys of California waters were conducted in 1979, 1980, 1991, and 1993, and surveys of the entire U.S. west coast were conducted in 1996, 2001, 2005, 2008, and 2012. These cruises often involve large NOAA research vessels (over 200 feet [61 m] long) that can stay at sea for several weeks. A recent draft Environmental Assessment for NMFS research in the California Current research area concluded that gray whales may be present when surveys occur and that 346 animals may be subjected to harassment as a result of acoustic devices used during surveys (NMFS 2013f). However, that report goes on to describe how the analytical framework used to derive that estimate likely results in a substantial overestimate of impacts. In addition, the report notes that most survey activity occurs offshore and is unlikely to interact with gray whales and other coastal-oriented species.

As recently as the late 1960s, some gray whale research involved the killing and sampling of over 300 hundred individual whales (Rice and Wolman 1971). However, gray whale research today generally relies on non-lethal forms of data collection (e.g., photographs and biopsies). Some methods of tagging and sampling can injure whales, but there has been significant progress in developing more effective tags and attachment methods that reduce adverse effects on whales while improving the quality of the resulting data (Weller 2008).

Growing interest in the Arctic Ocean system will likely see expanded research activities in northern portions of the gray whale range. For example, one of the most advanced research vessels ever built, the 261-foot (80-m) *R/V Sikuliaq*, was launched in 2012, was scheduled to begin research cruises in 2014, and will be homeported in Seward, Alaska (National Science Foundation 2012). In 2004, Russian and U.S. researchers initiated a Russian-American Long-term Census of the Arctic (RUSALCA) aboard the 235-foot (72-m) Russian research ship *Professor Khromov* (RUSALCA 2014). These cruises have been conducted annually and typically include surveys (including marine mammal observations) in areas used by gray whales in the Bering Sea. While unlikely, it is conceivable that larger research vessels, such as those noted above, could strike and injure or kill a gray whale. For example, in 2009, a 50-foot NOAA research vessel struck a North Atlantic right whale off the coast of Massachusetts, leaving visible lacerations from the ship's propeller on the whale's fluke (Fraser 2009).

Research studies also employ small vessels that may intentionally or unintentionally encounter gray whales. Surveys focused on gray whale identification and biology typically involve small boats in close proximity to whales so that researchers can affix tags, take high-quality pictures for photo-identification, or obtain biopsy samples for genetic and toxicological studies. Pursuit by small research vessels would likely elicit responses comparable to whale-watching vessels. Also, as described in Subsection 3.4.3.6.6, Vessel Interactions, gray whales have been observed to respond to tagging by slapping their fluke and swimming rapidly, but usually return to pre-tagging behavior shortly after the event. The response of gray whales to biopsy has not been described, but studies of other mysticetes have reported a range of responses from little or no reaction to brief, sometimes dramatic, changes in behavior (Brown et al. 1991; Weinrich et al. 1991; Clapham and Mattila 1993; Gauthier and Sears 1999).

We conclude that scientific research is a reasonably foreseeable future action that will continue to impact gray whales (most likely resulting from vessel strikes or disturbance) at the same rate as in the recent past (i.e., since the lethal research conducted in the 1960s by Rice and Wolman [1971]) throughout their range in the ENP, with the possibility that such impacts could increase in the Arctic as that region is explored for climate research, shipping, and oil and gas development.

5.1.3.8 Natural Mortality

As described in Subsection 3.4.3.1.6, Natural Mortality, sources of natural mortality for gray whales include predation, disease, and starvation. When we proposed to de-list gray whales in 1991 (56 Fed. Reg. 58869, November 22, 1991) we reviewed factors affecting the species, including disease and predation. We noted that gray whales have a low natural mortality rate and that there is no information indicating that disease or predation constitutes a threat to the continued welfare of the species.

In 1999/2000, the mass stranding of ENP gray whales along the west coast led us to declare an unusual mortality event. Population numbers declined perhaps as much as 25 percent between the 1997/1998 count and the 2001/2002 count (Table 3-3). We convened a Working Group (Gulland et al. 2005) to assess the event because stranding rates had increased dramatically, animals were emaciated, and strandings occurred throughout the species' range, including areas where such events had not been historically noted. The Working Group concluded that the causes of this large-scale event were unknown and probably a result of both density dependence and environmental variability, noting that populations that are at or near carrying capacity may be more vulnerable to environmental variability because of nutritional stress (Gulland et al. 2005). Such stress was implicated in 2007 when researchers investigating one of the main calving-breeding lagoons in Mexico noted large numbers of whales that seemed malnourished and "skinny" in appearance (Subsection 3.4.3.1.7, Strandings). However, those conditions did not result in an unusual mortality event, and the 1999/2000 event remains the only one recorded for gray whales. Moreover, we concluded in our stock assessment report that several factors since 2000 indicate the mass stranding was a short-term acute event and not a chronic situation or trend (Carretta et al. 2014).

Subsection 3.4.3.1.6, Natural Mortality, also notes that killer whales are the primary natural predators of gray whales, but it is difficult to quantify how many gray whales are killed or approached by killer whales each year. Nonetheless, NMFS scientists have noted evidence that predation by mammal-eating "transient" killer whales may be a significant mortality factor (especially on gray whale calves) and could increase if those killer whale populations continue to increase in the ENP (Murphy 2014; NMFS 2014d). It is unclear how natural mortality may be influencing the WNP stock of gray whales, although Bradford et al. (2009) noted a high incidence of killer whale tooth scars. This stock has been increasing in abundance in recent years (Cooke et al. 2013); however, its small size, limited number of reproductive females, and relatively low calf survival are likely to be key factors limiting potential population growth (Burdin et al. 2012).

We conclude that natural mortality is a reasonably foreseeable future event that will continue to impact North Pacific gray whales and that the ENP gray whale stock will continue to fluctuate as it adjusts to natural and human-caused factors affecting the carrying capacity of the environment (Carretta et al. 2014). While the WNP stock has increased over the past 10 years, it remains small and likely more susceptible to changes in mortality (natural or human-caused).

5.1.3.9 Climate Change and Ocean Acidification

Climate change is underway and the scientific evidence indicates that average temperatures in the air, land, and sea are increasing at an accelerating rate. Long-term negative environmental impacts associated with climate change include rising sea levels as a result of melting glaciers and sea ice and seawater expansion, altered weather patterns and extremes, and ecosystem changes affecting species distributions and dynamics. A report on ecological impacts of climate change by the National Academy of Sciences (2008) states that most of the observed global and regional warming over the past 50 years is the result of increased greenhouse gases generated by human activities (e.g., burning of fossil fuels by vehicles such as ships and boats). The report goes on to note that there is only a very limited understanding of how global climate change might affect whole ocean ecosystems.

Although climate changes have been documented over large areas of the world, the changes are not uniform and affect different areas in different ways and at different intensities. For example, while gently sloping beaches in the project area could be most vulnerable to sea-level rise (e.g., Pendleton et al.'s [2004] assessment for Olympic National Park), Mote et al. (2008) estimate that the northwest Olympic Peninsula will experience very little relative sea-level rise because of rates of local tectonic uplift that currently exceed projected rates of sea level rise. In contrast, Arctic regions have experienced some of the largest changes (e.g., reduced ice cover and loss of multi-year ice), with major implications for the marine environment as well as for coastal communities (Arctic Climate Impact Assessment 2004; Larsen et al. 2014). Global climate change is also likely to increase human activity in the Arctic, including oil and gas exploration and shipping, as sea ice decreases (Hovelsrud et al. 2008).

In addition to affecting air and water temperatures, carbon dioxide (CO_2) created by human activities is absorbed into the oceans, resulting in an increase in acidity of surface ocean waters (up to a depth of 328 feet [100m]). Scientists predict that by 2100 the acidity (pH) of surface ocean waters will be at a level not experienced for at least the past 420,000 years, and that the rate of change will be 100 times the maximum rate detected during that period (Royal Society 2005). As noted in Subsection 3.4.3.6.11, Climate Change and Ocean Acidification, ocean acidification will likely affect calcifying organisms (many of which are important in the gray whales' diet) and may alter entire ecosystems if organisms are unable to adapt to the projected changes. There is considerable uncertainty about the degree to which these organisms will be affected by increased ocean acidity.

Bluhm and Gradinger (2008) examined the availability of pelagic and benthic prey in the Arctic and concluded that pelagic prey is likely to increase while benthic prey is likely to decrease in response to climate change. They noted that marine mammal species that exhibit trophic plasticity (such as gray whales that feed on both benthic and pelagic prey) will adapt better than trophic specialists. Moore (2008) characterized gray whales as useful "sentinels" of climate change, citing various lines of evidence that the health and habits of gray whales seem to be tracking changes in the North Pacific and western Arctic ecosystems.

We conclude that climate change is a reasonably foreseeable future event, with predictable impacts on the physical environment. For example, sea ice is likely to recede, sea levels are likely to rise, and acidity levels are likely to increase. Some biological impacts are also predictable, such as a decreased ability for some organisms to form shells. However it is speculative to predict how those changes will affect marine food webs.

5.1.3.10 U.S. Government Policy

Subsection 3.8, Social Environment, and Subsection 3.10, Ceremonial and Subsistence Resources, describe some aspects of the U.S. government's legacy of diminishing and discouraging Makah subsistence and ceremonial practices. The Tribe's waiver application (Makah Tribe 2005) and its recent needs statement submitted to the IWC (Renker 2012) also detail the impacts of federal policies that have had major and lasting influences on Makah culture. Examples of such policies included banning potlatches and traditional secret societies, replacing a hereditary leadership system with an egalitarian election-based system, forcing children to attend boarding schools and abandon the Makah language, and promoting agricultural practices ill-suited to the landscape over traditional reliance on harvesting marine resources. As evidence of the latter, Renker (2012) noted:

> While the Treaty of Neah Bay preserved the Makah right to hunt whales and seals, and to fish in usual and accustomed grounds, the United States aggressively pursued policies that were intended to transform Makahs and other Indian communities into "civilized" people. Assistance sent to the Makahs contained agricultural tools, rather than items which supported any of the active components of the Makahs' maritime way of life. Instead of tools and materials which would help to procure, process, or preserve whale, seal, or fish products, Makahs received pitchforks, scythes, hoes, and sickles.

Although some of these policies have changed in the past century (e.g., the school system no longer separates Makah children from their families), their legacy affects the same cultural values that are likely to be affected by a denial of the Tribe's request under Alternative 1: tribal identity, individual and community pride and self-esteem associated with pursuing cultural activities, a sense of autonomy and control of the Tribe's destiny, and confidence in the federal government (Subsection 4.10.3.1, Alternative 1, No Action). In the future, it is likely that the U.S. government would continue to honor the 1855 Treaty of Neah Bay (refer to Subsection 1.2.2.4, The Federal Trust Responsibility). Other future government policies are difficult to predict as are future trends in the values of the dominant culture that may affect Makah ceremonial and subsistence practices.

5.2 Water Quality

As described in Subsection 3.2.3, Water Quality, Existing Conditions, the Washington State Department of Ecology has not listed any of the waters in the project area as impaired (in other words, no past or current actions are negatively affecting the quality of waters in the project area to the point that they are impaired). Oil and gas exploration is expected to continue to be focused in Arctic regions outside the analysis area. Some accidental spills from a variety of ocean-going vessels (including commercial, charter, and research vessels) could increase in the future as shipping increases and can be expected to have localized adverse effects on water quality. Effects on water quality associated with potential LNG and wave energy facilities cannot be predicted given the uncertainties about whether and where any facilities will actually be built.[7] The Navy's draft EIS for the Northwest Training Range Complex (U.S. Navy 2014a) found that chemical, physical, or biological changes in sediment or water quality would not be detectable and would be below or within existing conditions or designated uses. The basis for this conclusion includes the following reasons:

- Expended materials and activities are widely dispersed in space and time. When multiple stressors occur at the same time, it is usually for a brief period. Potential areas of negative impacts would be limited to small zones adjacent to the explosive, metals, or chemicals other than explosives. The failure rate is low for explosives and materials with propellant systems, limiting the potential impacts from the chemicals other than explosives involved.
- Many components of expended materials are relatively nonreactive, corrode slowly, and most components are subject to a variety of physical, chemical, and biological processes that render them benign.
- Several studies at sites used frequently for training and testing activities in the Puget Sound found traces of metals, but all concentrations were well below background levels for both sediment and water quality.

Therefore, activities in the U.S. Navy Training Complexes are not expected to adversely affect water quality.

Along the Oregon and Washington coasts, the occurrence of a "dead zone"—an area of seawater with insufficient oxygen to support most marine life—has been linked to climate change (National Academy of Sciences 2008). Suggested causes include climate-related changes in coastal winds and ocean circulation as well as the possibility that warmer ocean waters have directly affected the water column's ability to hold oxygen. In a recent report by the U.S. Global

[7] The Environmental Assessment for the Makah Bay wave energy project (now abandoned) concluded that it would have had only localized and short-term impacts on water resources (FERC 2007).

Change Research Program (Mote et al. 2014), "coastal vulnerabilities" in the analysis area include the following issues related to water quality:

- Coastal areas will be subject to increased erosion, and wetlands, tidal flats, and beaches will be inundated.
- Coastal waters will warm and further acidify (Northwest waters are already among the most acidified in the world). This acidification could cause changes in the abundance and types of shell-forming organisms, some of which are important in the gray whale's diet.
- Warmer water in regional estuaries (such as Puget Sound) may contribute to a higher incidence of harmful blooms of algae linked to paralytic shellfish poisoning.

A number of federal, state, and local actions are being planned or implemented to mitigate effects of climate change (e.g., energy efficiency measures, clean technologies, and alternative fuels), but there is not always broad acceptance of such actions (Melillo et al. 2014).

Increased vessel traffic because of a gray whale hunt could increase the risk of oil spills and generation of greenhouse gases in the analysis area above existing levels associated with vessels involved in shipping, fisheries, tourism, or scientific research. It is likely, however, that the amount of oil from a potential spill or greenhouse gas emissions associated with a hunt would be small (because of the size of vessels involved) and would quickly disperse (Subsection 4.2.3, Water Quality [Evaluation of Alternatives]).

For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on water quality.

5.3 Marine Habitat and Species

As described in Subsection 3.1.1.1.2, Designation and Regulatory Overview, the marine and coastal environment of the northern Washington coast is highly productive and nearly pristine. As described in Subsection 3.3.3, Marine Habitat and Species (Existing Conditions), the marine habitat and species in the project area are situated in the larger California Current system and are shaped by large-scale physical processes that would not be affected by any hunting or associated activities under any of the alternatives. In addition, hunting activities under any of the alternatives would have only minor short-term localized impacts on the marine habitat or species in the project area. Oil and gas exploration is expected to continue to be focused in Arctic regions where disturbance from development and accidental spills can be expected. However, impacts to gray whales would depend on the location and timing of exploration and development activities, and the location, timing, and volume of spills. Effects on habitat and species associated with potential LNG and marine energy facilities cannot be predicted given the uncertainties about whether and where any facilities will actually be built. Although the Makah Bay wave energy project has been halted, the FERC assessment (FERC 2007) associated with it provides useful insights into the types of mitigation that could be pursued for similar types of projects. It included a variety of protective measures to reduce any potential impacts to marine habitats and species, including developing a fuel and oil spill control, prevention, and countermeasures plan; developing and implementing a plan to conduct a baseline and post-installation hard substrate benthic community survey along the proposed submarine transmission line route; and removing existing marine debris and derelict fishing gear from the immediate project area prior to project construction and installation.

Subsection 5.1.3.3, Military Exercises, and Subsection 5.2, Water Quality, summarize the impacts of military exercises in the analysis area and that information is equally relevant to our assessment of marine habitat and species. Activities in the U.S. Navy training complexes that may affect marine communities include explosions and materials expended during training and testing activities. Marine habitat subjected to underwater detonations would primarily be soft-bottom sediment. These disturbance events would be spread out over time, allowing recovery of the area by natural processes. The Navy's draft EIS for the Northwest Training Range Complex (U.S. Navy 2014a) found that any impacts from training and testing exercises are not expected to result in detectable changes to marine vegetation growth, survival, or propagation and are not expected to result in population-level impacts. Potential impacts on marine invertebrates are largely qualitative and speculative, and are not expected to decrease the overall fitness or result in long-term population level impacts on any given population. Likewise, the Navy determined that proposed military exercises would not diminish the ability of soft shores, soft bottoms, hard shores, hard bottoms, or artificial substrates to function as habitat.

Subsection 3.4.3.6.11, Climate Change and Ocean Acidification, Subsection 5.1.3.9, Climate Change, and Subsection 5.2, Water Quality, summarize the impacts of climate change, and that information is equally relevant to our assessment of marine habitat and species. The climate change report by the National Academy of Sciences (2008) notes that along the Pacific coast there has already been an observed shift in the types of species that are found in certain locations. For example, formerly "southern" species have become more abundant, while many "northern" species have declined. The U.S. Global Change Research Program (Mote et al. 2014) also notes that rising sea levels are expected to negatively impact species such as shorebirds and forage fish that rely on coastal wetlands, tidal flats, and beaches, especially in areas where habitats cannot shift inland because of topography or physical barriers created by human development. It also projects that anadromous species such as salmon will face adverse freshwater conditions (e.g., warmer streams with reduced flows) once they leave the ocean. That report goes on to underscore that "as species respond to climate change in diverse ways, there is potential for ecological mismatches to occur—such as in the timing of the emergence of predators and their prey." In the analysis area, one group of species that seems likely to be adversely affected—shell-forming invertebrates—is an important prey base for gray whales. Many of the climate change impacts observed and projected take many decades to detect. In the analysis area it is reasonable to conclude that changes will occur but it remains unclear and largely speculative how marine species and habitats will respond and adapt to such changes. As noted in Subsection 5.1.3.9, Climate Change and Ocean Acidification, sea level rise could impact gently sloping beaches in the project area, but the northwest Olympic Peninsula overall is expected to experience very little sea-level rise.

Increased vessel traffic as a result of a gray whale hunt could increase the risk of oil spills and the generation of greenhouse gases in the analysis area above existing levels associated with vessels involved in shipping, fisheries, tourism, and scientific research. It is likely, however, that the amount of oil from a potential spill or greenhouse gas emissions associated with a hunt would be small (because of the size of vessels involved), would quickly disperse, and have only short-term and localized effects on marine species and habitats in a the analysis area.

For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on marine habitat and species.

5.4 Gray Whales

Subsection 3.4, Gray Whales (Affected Environment), provides a comprehensive review of the North Pacific gray whale stocks (both WNP and ENP) and the PCFG feeding aggregation inhabiting the project area. Subsection 4.4, Gray Whales (Environmental Consequences), considers the potential impacts of the six alternatives on the welfare of individual gray whales as well as impacts on the larger stocks and PCFG (including whales in local survey areas within the PCFG range).

For the ENP gray whale stock as a whole, past over-harvesting led to its listing in the United States as an endangered species. With the moratorium on commercial harvest, the stock recovered to the point where it was de-listed. We consider the stock to currently be at or near its carrying capacity and thus within its OSP. All six alternatives are likely to have the same effect on the ENP gray whale stock as a whole, which is the removal of an average of 124 whales per year (zero to four whales on average killed by Makah hunters with the remainder harvested in the Chukotkan hunt). This level of mortality would be added to other sources of human-caused mortality that include whales that are killed by ship strike, whales that are killed incidental to fishing operations, and whales that are struck and lost during a hunt and that may die as a result of their injuries. The PCFG is presently not considered a population stock under the MMPA, but we have included the PCFG in recent stock assessment reports because it appears to be a distinct feeding aggregation and may warrant consideration as a distinct stock in the future (Carretta et al. 2014).

The WNP stock remains listed as an endangered species under the ESA and is a depleted stock under the MMPA. Recent information from tagging, photo-identification, and genetic studies shows that some whales identified in the WNP off Russia have been observed in the ENP, including the project area. Given this interchange and the occurrence of whales in U.S. waters, a 2012 NMFS task force agreed that a stand-alone WNP gray whale population stock assessment report was warranted (Weller et al. 2013). Studies to date have recorded a total of 27 gray whales observed in both the WNP and ENP (the earliest record in 1995) (Weller et al. 2012), which is a small fraction of the roughly 20,000 whales in the ENP stock. As described in Subsection 3.4.3.2.4, WNP Status, Carrying Capacity, and Related Estimates, and Subsection 4.4.3.2.2, Change in Abundance and Viability of the WNP Gray Whale Stock, modeling based on Moore and Weller (2013) indicates that under the Tribe's proposed action hunters might strike a WNP whale approximately once every 100 years, equating to a 7 percent chance of hunters actually striking at least one WNP whale in 6 years (i.e., the current duration of the IWC catch limit for ENP gray whales). Given the small size of the WNP stock and the very limited data on the occurrence of whales observed in the WNP in the analysis area, it is speculative to predict whether appreciable effects would be expected from any of the activities assessed in Subsection 5.1.3, Past, Present, and Reasonably Foreseeable Future Actions.

Increased vessel traffic as a result of a gray whale hunt could increase the risk of oil spills and generation of greenhouse gases in the analysis area above existing levels associated with vessels involved in shipping, fisheries, marine energy and mining, tourism, and scientific research. It is likely, however, that the amount of oil from a potential spill or greenhouse gas emissions associated with a hunt would be small (because of the size of vessels involved), would quickly disperse, and have only short-term and localized effects on marine species and habitats in the analysis area. The most recent stock assessment report (Carretta et al. 2014) evaluates the status of the ENP stock and the PCFG and summarizes recent data on human-caused mortality and serious injury because of fisheries, ship strikes, and aboriginal harvest in Russia. Based on 2007 to 2011 data, the estimated annual level of human-caused mortality and serious injury for ENP gray whales includes Russian harvest (123), mortality from commercial fisheries (2.45), and ship strikes (2.2), totaling 127 whales per year. Estimates for human-caused mortality for whales observed in the PCFG range and season include annual average mortality from commercial fisheries (0.15), ship strikes (0.1), and an illegal hunt (0.2) totaling 0.45 whales per year. These values are well below the calculated annual levels of potential biological removal of 558 ENP whales and 2.7 PCFG whales. A related assessment by Scordino et al. (2014b) identified six gray whales killed or injured by ship strikes or in fisheries interactions in Canadian waters during 2008 to 2012 (i.e., a different timeframe than used in the stock assessment report). Even if all of these whales were classified as killed PCFG whales (an annual average mortality of 1.2 PCFG whales) and added to the values reported by Carretta et al. (2014), the annual average human-caused mortality would be 1.65 whales observed in the PCFG range and season, which is still much lower than the 2.7 PCFG whales reported as the potential biological removal level in our stock assessment report. Also, the IWC's modeling of the Tribe's proposed hunt (IWC 2013c) (refer to Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity, and Related Estimates – IWC Implementation Review of PCFG Gray Whales) included an even more precautionary estimate of non-hunting human-caused mortality[8] (2.0 PCFG whales), which is considerably higher than the 0.45 whales in the PCFG range and season reported in the most recent stock assessment report (Carretta et al. 2014).

Data regarding gray whale mortalities in Mexico and Russia as a result of interactions with shipping and fisheries are not readily available. However, the abundance of ENP and PCFG whales has been stable since 2001 as have the number of strandings from Alaska to California[9] (Subsection 3.4.3.1.7, Strandings). Also, fisheries-related mortalities in Canada are thought to be small and the large stock size and rate of increase over the past 20 years makes it unlikely that unreported mortalities from those fisheries would be a significant source of mortality for this stock (Angliss and Outlaw 2008). The number of whales struck and lost in the Chukotka hunt has varied annually, with nine reported in 2005 as the highest recent reported number. Assuming all struck and lost whales die, the average number of whales potentially lost from all sources of human-caused mortality would be approximately 135 animals per year. That number is only one-quarter of the calculated PBR for the ENP gray whale stock. The effects of human-caused

[8] The IWC model assumed this value would vary directly with changes in abundance.
[9] We were unable to obtain Mexico stranding data for 2003 and 2006 to 2011.

mortality would not affect the ability of the ENP gray whale stock as a whole to be maintained at its OSP level.

As described in Subsection 5.1.3.5, Tourism, although whale watching has grown in recent years within the overall analysis area, some regions within this area have remained relatively stable (or even declined) so it is not possible to predict how much this industry might grow in the future and what, if any, appreciable effects might accrue beyond those assessed in Subsection 4.4, Gray Whales.

Oil and gas exploration is expected to continue to be focused in Arctic regions where disturbance from development and accidental spills can be expected. However, impacts to gray whales would depend on the location and timing of exploration and development activities, and the location, timing, and volume of spills. Appreciable effects on gray whales from potential LNG and marine energy facilities cannot be predicted given the uncertainties about whether and where any facilities will actually be built. If these facilities are developed in the analysis area they could affect migrating or feeding gray whales. Such projects could have a greater impact on summer-feeding PCFG whales than on the ENP gray whale stock as a whole because the summer-feeding whales spend more time in the vicinity of potential LNG facilities. If marine energy or LNG projects negatively affect the abundance of gray whales identified in the PCFG or the OR-SVI survey area, the number of identified whales that could be harvested would be reduced accordingly (i.e., via the formulas used to place additional limits on the harvest or mortality of PCFG whales).

As discussed above in Subsection 5.1.3.3, Military Exercises, impacts to gray whales in the Navy's complexes would mostly stem from the use of sonar and other active acoustic sources during training and testing activities. However, these are not expected to injure gray whales and long-term consequences would not be expected on individual gray whales or the WNP and ENP stocks overall. In addition, the Navy does not anticipate vessel strikes on gray whales but has taken the precautionary step of requesting authorization from NMFS to incidentally take a total of one to four large whales annually by injury or mortality in the NWTR and SOCAL complexes. Further north, training activities in the GOA Complex normally occur during April and October, and most gray whales would have moved through the area by mid-June to feed north of the Aleutian Islands (Subsection 3.4.3.3.2, ENP Seasonal Distribution, Migration, and Movements) (U.S. Navy 2011). The Navy's most recent supplemental draft EIS for this complex (U.S. Navy 2014b) projects a large reduction in the number of predicted acoustic stressor impacts compared to the previous EIS (U.S. Navy 2011) and therefore it is even less likely that there would be any long-term impacts on individuals or populations of marine mammals.

As described in Subsection 5.1.3.7, Scientific Research, we expect that impacts from research vessels and activities will likely continue to affect gray whales (most likely resulting from vessel strikes or disturbance) at the same rate as in the past throughout their range, with the possibility that such impacts could increase in the Arctic as that region is explored for climate research, shipping, and oil and gas development. However, there is no evidence to indicate that disturbance or mortalities of whales from scientific research would result in any appreciable effects beyond those assessed in Subsection 4.4, Gray Whales.

Increased killer whale predation could be a concern for ENP gray whales, but it is unlikely that an increase in predation would result in appreciable effects when combined with mortality from a tribal hunt because none of the alternatives would result in increased mortality of ENP gray whales overall. Increased killer whale predation could also be a concern for PCFG whales, although it is not possible to predict how much such predation could increase. If killer whale predation did result in a decrease in PCFG abundance, allowable harvest levels would go down under all action alternatives, because the limits on harvest levels under all alternatives are based on the population abundance. Because such an adjustment accounts for a change in abundance, we would not expect the impacts of a hunt under any of the alternatives to have cumulative effects with killer whale predation when taken into consideration with past, present, and reasonably foreseeable future actions. (In other words, a decrease in abundance of 10 percent would result in a decrease in allowable PCFG harvest of 10 percent, so mortality from a hunt would not be magnified.) As noted in Subsection 5.1.3.8, Natural Mortality, it is unclear how natural mortality may be influencing the WNP stock of gray whales.

Global climate change may also affect abundance, viability, and distribution of gray whales in the future. Gray whales feed on a variety of prey, both benthic and pelagic, and the whales will switch feeding areas and strategies in response to changes in prey availability (Subsection 3.4.3.3, Distribution and Habitat Use). Changes in Arctic conditions may cause many seasonal migrant species to range farther north in search of prey, and it seems that gray whales may already be doing so (Moore et al. 2007; Moore and Huntington 2008). Moore and Huntington (2008) observed that “gray whales are perhaps the most adaptable and versatile of the mysticete species,” are opportunistic foragers, and have recently been documented feeding year-round off Kodiak, Alaska. In a recent rangewide workshop on gray whales (IWC 2014f), it was noted that the loss of Arctic sea ice now allows gray and other baleen whales a month or more longer to feed in the Arctic, and changes in the primary production there may result in more prey for these whales. Bluhm and Gradinger (2008) examined likely trends in the availability of pelagic and benthic prey in the Arctic and concluded that pelagic prey is likely to increase while benthic prey is likely to decrease. They noted that marine mammal species that feed both pelagically and benthically (such as gray whales) will fare better than those that only feed benthically. For gray whales, they observed that the composition of gray whale prey may be less important than the energy density at feeding sites. In their review of reported climate change impacts on gray whales, Salvadeo et al. (2013) cited the following as likely gray whale responses to global warming:

- Fewer whales in the Gulf of California
- Increased numbers of mothers with calves along the California coast
- Winter occurrence of whales in their feeding areas
- Recolonization of the Atlantic Ocean by gray whales
- Decrease in whale numbers in the breeding lagoons

Ocean acidification is another future development that could affect gray whales by affecting their prey. Increased acidity in the ocean will reduce the abundance of shell-forming organisms (Fabry et al. 2008; Hall-Spencer et al. 2008), some of which are important in the gray whales' diet (Moore and Huntington 2008). Although there is considerable uncertainty about the degree to which these organisms will be affected by increased ocean acidity, modeling analyses by NMFS scientists indicate that the flexible foraging strategies of gray whales may mitigate the effects of ocean acidification on the species. The Atlantis model predicts no change in the biomass of the baleen whale group, 62 percent of which is made up of gray whales, even under the most extreme scenario for future acidification (Dufault et al. 2009; Kaplan et al. 2010). We conclude that any climate-induced impacts on gray whales will likely manifest over the long term, but these impacts are too speculative to predict at this time.

For gray whales in the PCFG range and local survey areas within this range (e.g., the OR-SVI and Makah U&A), there are no other appreciable effects that are unique from those that affect the ENP stock as a whole. Because PCFG whales are a small subset of the larger ENP stock (numerically and geographically), it is possible that future activities might have disproportionately greater effects on PCFG whales and whales using local survey areas. However, such impacts are not foreseen at this time and would depend on the location, timing, and magnitude of activities/disturbances. Therefore, adding the potential disturbance and mortalities associated with a gray whale hunt under Alternatives 2 through 6 to existing levels of disturbance and mortality of past, present, and reasonably foreseeable future actions would not be expected to have cumulative effects on gray whales in the PCFG, local survey areas within the PCFG range, and individual gray whales. For individual whales, it is possible that the stress associated with hunting, when added to existing sources of stress such as those described in Subsection 3.4.3.6, Known and Potential Anthropogenic Impacts, could lead to the mortality of some individual whales. This possibility is explored in Subsection 4.4.2.1, Change in Abundance and Viability of the ENP Gray Whale Stock.

As a final note, if another mass stranding of gray whales did occur in the future that reduced the ENP gray whale population by one fourth, and the reduction equally affected PCFG whales, the result would be a drop in PCFG abundance from around 200 to around 150 whales. This could magnify the effects on the PCFG of mortality associated with a tribal hunt, because the hunt-related death of up to six animals from a group of 150 whales would have a bigger impact than it would on a group of 200. It is too speculative to conclude that another mass stranding is likely in the future; however, it would be possible to mitigate for such a possible event by including measures in hunting regulations that would constrain hunting in the event of a mass stranding. Also, the Scientific Committee of the IWC annually monitors the status of ENP gray whales. In the event that gray whale abundance declines as a result of human activities or other unforeseen causes, the IWC has a process in place to adjust catch limits for aboriginal subsistence hunting (Subsection 1.2.4.1.3, IWC Aboriginal Subsistence Whaling). In addition, if the ENP gray whale stock becomes depleted, the MMPA would prohibit NMFS from issuing permits to the Makah Tribe to hunt the stock, regardless of the existence of a waiver.

5.5 Other Wildlife

Subsection 4.5.3, [Other Wildlife] Evaluation of Alternatives, analyzes the effects likely to occur to other wildlife species from implementation of Alternatives 2 through 6. These effects would primarily be from vessel noise and disturbance and would be greater under alternatives that involve the greatest number of days of hunt-related trips (Alternatives 2, 3, and 6), although hunting that takes place farther offshore (as under Alternative 3) would have a lower likelihood of affecting species that are present on the rocks and islands closer to shore. Some disturbance would also be expected from aircraft and weapons discharge associated with a hunt. Under all alternatives these effects are expected to be minor and temporary for all species with the possible exception of some seabird colonies during the nesting season.

Subsection 3.13.3, [Transportation] Existing Conditions, describes existing levels of vessel and air traffic in the project area to which the additional vessel and air traffic would be added under Alternatives 2 through 6. Future increases in shipping have the potential to affect marine mammals and birds through vessel interactions and noise. Vessel collisions with marine mammals, though rare, could increase as a result of increased shipping.

Oil and gas exploration is expected to continue to be focused in Arctic regions where disturbance from development and accidental spills can be expected. However, impacts to gray whales would depend on the location and timing of exploration and development activities, and the location, timing, and volume of spills. Effects on wildlife associated with potential LNG and wave energy facilities cannot be predicted given the uncertainties about whether and where any facilities will actually be built. Although the Makah Bay wave energy project has been halted, the FERC assessment (FERC 2007) associated with it provides useful insights into the types of mitigation that could be pursued for similar types of projects. It included a variety of protective measures to reduce any potential impacts to marine habitats and species, including developing a fuel and oil spill control, prevention, and countermeasures plan; developing and implementing a plan to conduct a baseline and post-installation hard substrate benthic community survey along the proposed submarine transmission line route; and removing existing marine debris and derelict fishing gear from the immediate project area prior to project construction and installation.

Activities in the U.S. Navy Training Complexes that may affect wildlife include collisions, explosions, and materials expended during training and testing activities. The EIS found that potential impacts on certain fish, bird, turtle, and marine mammal species could include injury or mortality, but impacts are not expected to decrease the overall fitness of or result in long-term population level impacts on any given population. In cases where potential impacts rise to the level that warrants mitigation, the Navy has identified numerous measures, including enhanced training, lookouts/surveillance, buffers, and approach protocols.

Global climate change will likely affect the distribution, abundance, and viability of various wildlife species. A report on ecological impacts of climate change by the National Academy of Sciences (2008) states that “climate change is happening on a global scale, but the ecological impacts are often local and vary from place to place.” That report goes on to describe how shifts have already been observed in species’ ranges and phenology (the timing of biological activities that occur seasonally). Along the Pacific Coast, one observed shift is that formerly “southern” species have increased in abundance since the mid-20th century, while many “northern” species have decreased as temperatures warm.

Ocean acidification is likely to adversely affect shell-forming organisms which could in turn have widespread impacts on marine ecosystems (Fabry et al. 2008); however, there is considerable uncertainty about the degree to which particular species will be affected. Modeling analyses by NMFS scientists indicate highly variable results within food webs and that flexible foraging strategies may mitigate the effects of ocean acidification on certain species. For example, the Atlantis model predicts that groundfish stocks such as English sole, arrowtooth flounder (i.e., large flatfish), and yellowtail rockfish (midwater rockfish) may be particularly susceptible to the loss of shelled prey items from their diet (Kaplan et al. 2010). In contrast, some species of nearshore fish were predicted to increase (relative to a no acidification scenario) because of declines in their predators. We conclude that any changes in species assemblages and food webs will likely manifest over the long term, but these are too speculative to predict.

For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on other wildlife.

5.6 Economics

Subsection 3.6.3, [Economics] Existing Conditions, describes Clallam County's recent increase in average unemployment rate (from 8.7 percent in 2002 to 10.1 percent in 2011) and increase in personal income (63 percent increase from 2000 to 2010). Levels of unemployment are higher and personal income lower in Neah Bay compared to county-wide data. There are no foreseeable future trends that may affect the present economic climate in the county or in Neah Bay.

Both tourism and fishing are important industries in the analysis area. Subsection 4.6, Economics, analyzes the potential for minor temporary increases or decreases in tourism in Clallam County and Neah Bay if a gray whale hunt is authorized under Alternatives 2 through 6. It also describes no likely change in economic conditions if a gray whale hunt is not authorized under Alternative 1. According to the environmental assessment for the Makah Bay wave energy project (FERC 2007), that project would have had a positive effect on the economy in the project area.

Given the current economic climate and generally favorable economic trends in Clallam County, and that the potential effects of any of the alternatives are either nonexistent or minor and temporary, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on the economics of the project area.

5.7 Environmental Justice

Subsection 4.7, Environmental Justice, describes the potential effects on the Makah Tribe (the population of concern for purposes of considering Executive Order 12898, Environmental Justice) of the No-action Alternative and the five action alternatives. Because the Makah Tribe has requested authorization of a whale hunt, impacts to the Tribe under the action alternatives are not an issue of concern under the Executive Order. (However, it is possible that the Makah Tribe would experience negative cumulative effects under the No-action Alternative for the reasons described under Subsection 5.10, Ceremonial and Subsistence Resources).

5.8 Social Environment

As described in Subsection 3.8, Social Environment, various groups and individuals have different opinions about hunting whales. NMFS received public comments about the hunt from a broad geographic area—public scoping occurred in the vicinity of the project area as well as in Washington D.C. Makah tribal members and other tribes generally support the hunt, while the general public has mixed feelings about the issue. Subsection 4.8, Social Environment, analyzes the potential for these different groups to experience both increased social conflict and increased social bonding, within the groups and outside the groups, under any of the alternatives. Other social issues exist that may have caused conflict or bonding within or among these groups in the past, and new issues are likely to arise in the future. Therefore, we conclude that social events are too speculative to inform a cumulative impact analysis. For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on the social environment.

5.9 Cultural Resources

As analyzed in Subsection 4.9, Cultural Resources, no adverse effects are expected to cultural resources if hunting is authorized under Alternatives 2 through 6. Some beneficial effects are possible to both listed and unlisted cultural sites historically used for whaling-related ceremonies if hunting is authorized. These sites are also used for other non-whaling activities.

For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on cultural resources.

5.10 Ceremonial and Subsistence Resources

Subsection 3.10.3, [Ceremonial and Subsistence Resources] Existing Conditions, describes the past and current status of Makah subsistence and ceremonial practices, including a history of such practices being discouraged by U.S. government policy and a recent resurgence in such practices. It also describes the prestige accorded whaling families in traditional Makah society. Subsection 4.9, Cultural Resources, examines the potential for resumption of whaling under Alternatives 2 through 6 to enhance the Tribe’s subsistence and ceremonial practices and, conversely, for implementation of Alternative 1 (no authorized hunting) to detract from these practices. Future policies of the U.S. government are difficult to predict, as are future trends in the values of the dominant culture that may affect Makah ceremonial and subsistence practices. It is also not possible to predict the availability of subsistence resources in the future, although it is likely that resources will shift as global climate change affects the ocean ecosystem. It is possible that a denial of the Tribe's request under Alternative 1, when added to the legacy of U.S. government policies discouraging subsistence and ceremonial practices, would have negative cumulative effects beyond the effects of alternatives analyzed in Subsection 4.10, Ceremonial and Subsistence Resources.

5.11 Noise

Subsection 3.11, Noise, describes the relevant noise-related policies and jurisdictions, sensitive noise receptors, and background noise conditions in the project area. Of the actions reviewed in our cumulative impact analysis, those that contribute to noise levels do so primarily via vessel noise (e.g., shipping, military exercises, fishing, and scientific research) or sonar and detonations during Navy training and testing. All of these sources of noise are unpredictable in terms of time, location, and intensity. Under Alternatives 2 through 6 there may be some localized, temporary increases in noise levels because of hunt-related vessel traffic, media and protest activity, and rifle shots or grenade explosions. However, it is likely that the increased amount of noise associated with vessel traffic would be compensated for by high ambient noise levels (i.e., natural sounds, such as those of wind and surf). Rifle shots and grenade explosions would produce high-intensity noise but it would be of short duration and offshore. It is not possible to predict noise levels associated with protest activities, but they would also likely be localized and temporary (and subject to control by law enforcement if protest activities were to pose an imminent threat to public safety).

For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on noise.

5.12 Aesthetics

Under Alternatives 2 through 6 there may be some temporary aesthetic effects to people viewing gray whale hunts through the media or from local vantage points both inside and outside of the project area. There are currently no issues identified in the project area related to aesthetics, and those outside of the project area were addressed as a direct or indirect affect from media coverage or vantage points.

For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on aesthetics.

5.13 Transportation

Under Alternatives 2 through 6 there may be some localized, temporary effects on highway traffic in the project area, but no transportation effects would occur outside of the project area. Marine and air traffic effects outside of the project area were also analyzed in Section 4, Environmental Consequences.

For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on transportation.

5.14 Public Services and Public Safety

Under Alternatives 2 through 6 there may be some localized, temporary effects on police services in the project area, but no strains are anticipated on medical services in either the project area or on medical services in larger cities outside of the project area. It is not anticipated that localized needs for police services under any of the action alternatives would require additional services from law enforcement sources outside of the project area analyzed in Section 4, Environmental Consequences.

For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on public safety.

5.15 Human Health

Subsection 3.16.3, Human Health, Existing Conditions, describes the levels of contamination found in gray whales and the potential for food-borne pathogens associated with the butchering, storage, and preparation of gray whale products. It also describes the nutritional benefits of gray whale food products. As discussed in Subsection 4.16, Human Health, the contaminant level in the current diet of Makah tribal members is unknown, and it is not possible to evaluate the change in tribal members' exposure to contaminants or pathogens, or in their nutrition, without knowing how much or what type of whale products individuals would consume and without knowing the contaminant level and nutritional composition of their present diet. Furthermore, it is not possible to determine how past events such as a moratorium on whaling affected the overall health of the Makah Tribe because no data exist to demonstrate changes in health before and after whale hunting was allowed.

For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on human health.

5.16 National and International Regulatory Environment

As described in Subsection 4.17, Regulatory Environment Governing Harvest of Marine Mammals, it is too speculative to conclude that NMFS' decision to authorize or not authorize a whale hunt would affect marine mammals in the United States or whaling worldwide.

For the reasons described above, we conclude that when the effects of past, present, and reasonably foreseeable future actions are added to the direct and indirect effects of Alternatives 1 through 6, the incremental effects of Alternatives 1 through 6 are not likely to be different from the effects described in Section 4, Environmental Consequences. We therefore do not expect there would be significant cumulative effects on the national and international regulatory environment.

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Distribution List

Federal Agencies

Council on Environmental Quality
Federal Emergency Management Agency Region X
Fisheries and Oceans Canada
Marine Mammal Commission
National Parks Service Library
NOAA Habitat Conservation Division
NOAA National Marine Fisheries Service
NOAA National Marine Mammal Laboratory
NOAA National Marine Sanctuary Program
NOAA Olympic Coast National Marine Sanctuary
Olympic National Forest
Olympic National Park
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Department of the Interior, Bureau of Indian Affairs
U.S. Department of the Interior, Office of Environmental Policy and Compliance
U.S. Environmental Protection Agency (EPA) Region X
U.S. Fish and Wildlife Service
U.S. Representative, State of Washington, 1st, 2nd, 3rd, 6th, 7th, 8th, and 9th Districts
U.S. Senator, State of Washington, Seats 1 & 2

State Agencies & Elected Officials

Office of the Governor, State of Washington
Office of the Lieutenant Governor, State of Washington
Washington State Attorney General's Office
Washington State Department of Ecology
Washington State Department of Fish and Wildlife
Washington State Department of Health
Washington State Department of Natural Resources
Washington State House of Representatives Standing Committees-
Economic Development, Agriculture, and Trade Committee
Natural Resources, Ecology, and Parks Committee
Rules Committee
Washington State House of Representatives, 1st, 2nd, 5th, 10th, 11th, 19th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th, 35th, 36th, 37th, 38th, 39th, 40th, 41st, 42nd, 43rd, 44th, 45th, 46th, 47th, and 48th Districts
Speaker, Washington State House of Representatives
Majority Leader, Washington State House of Representatives
Minority Leader, Washington State House of Representatives
Washington State Senate, Standing Committees - International Trade & Economic Development Committee, Natural Resources, Ocean, Recreation Committee, Rules Committee, Water, Energy & Environment Committee, and Ways & Means Committee
Majority Leader, Washington State Senate
Minority Leader, Washington State Senate
Washington State Senator, 1st, 2nd, 5th, 10th, 11th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th, 35th, 36th, 37th, 38th, 39th, 40th, 41st, 42nd, 43rd, 44th, 45th, 46th, 47th, and 48th Districts

County & Local Agencies

Clallam Conservation District
Clallam County Commissioners
Clallam County Economic Development Corp.
Grays Harbor County Commissioners
Island County Commissioners
Jefferson County Commissioners
King County, Department of Natural Resources and Parks
Kitsap County Commissioners
Mason County Commissioners
Pacific County Commissioners
Pierce County Council
Pierce County Planning Department
Port Angeles Chamber of Commerce
San Juan County Commissioners
San Juan County Planning Department
Skagit County Commissioners
Snohomish County Commissioners
Thurston County Commissioners
Washington State Association of Counties
Whatcom County Council

Native American Tribes & Organizations

Affiliated Tribes of Northwest Indians
Chehalis Tribe
Coeur D'Alene Tribe
Columbia River Intertribal Fish Commission
Colville Confederated Tribes
Confederated Tribes and Bands of the Yakama Nation
Confederated Tribes of Grand Ronde
Confederated Tribes of Warm Springs
Cowlitz Indian Tribe
Hoh Indian Tribe
Jamestown S'Klallam Tribe
Kalispell Tribe
Lower Elwha Klallam Tribe
Lummi DNR
Lummi Indian Business Council
Makah Fisheries Management
Makah Indian Tribe
Muckleshoot Tribe
Muckleshoot Tribe Fisheries Department
National Congress of American Indians
Nez Perce Tribe
Nisqually Indian Tribe
Nooksack Indian Tribe
Northwest Indian College
Northwest Indian Fisheries Commission
Point-No-Point Treaty Council
Port Gamble S'Klallam Tribe
Puyallup Tribe
Puyallup Tribe Fisheries Department
Quileute Indian Tribe
Quileute Natural Resources
Quinault Indian Nation
Samish Indian Nation
Sauk-Suiattle Tribe
Shoalwater Bay Tribe
Skagit System Cooperative
Skokomish DNR
Snoqualmie Tribe
Spokane Tribe
Squaxin Island Tribe
Stillaguamish Indian Tribe
Suquamish Tribe
Suquamish Tribe Fisheries Department
Swinomish Tribe
Tulalip Tribes
Umatilla Confederated Tribes
Upper Columbia United Tribes
Upper Skagit Indian Tribe
Yakama Indian Nation

Organizations

Advocate of Animals
Advocates for Animals
American Cetacean Society
Animal Legal Defense Fund
Animal Protection Institute
Animal Welfare Institute
Australians for Animals
California Gray Whale Coalition
Cascadia Research Collective
CASH (Committee to Abolish Sport Hunting Inc)
Cetacea Defense
Cetacean Society International
Civitas (Citizens for Planetary Health)
Defenders of Wildlife National Headquarters
Earth Island Institute International Marine Mammal Project
Green Vegans
Humane Education Network
Humane Society of Canada
Humane Society of the United States
League of Women Voters
National Wildlife Federation
Nature Conservancy of Washington
Ocean Defense International
Olympic Peninsula Audubon Society
Pacific States Marine Fisheries Commission
Peninsula Citizens for the Protection of Whales
Sea Shepherd Legal
Seattle Audubon Society
Sierra Club - Cascade Chapter
Sierra Club - National Headquarters
The Fund for Animals
The Humane Society of the United States
The Mountaineers
The Peaceful Kingdom Alliance 4 Animals, Inc
The Pegasus Foundation
The Peninsula Citizens for the Protection of Whales
The Whaleman Foundation
The Wildlife Society
Washington Association of Conservation Districts
Washington Environmental Council
Washington Forest Law Center
Washington State Natural Resources Committee
Western Environmental Law Center Northwest Office
Wildlife Advocacy Project

Businesses

Meyer & Glitzenstein
MORI-ko L.L.C.
Parametrix
San Juan Safaris
Schubert & Associates
Sea Wolf Adventures
Whale Watch Operators Association Northwest
Ziontz, Chestnut, Varnell, Berley & Slonim

Media

Forks Forum
KING Television (Seattle)
KIRO Television (Seattle)
KOMO Television and Radio (Seattle)
KONP Radio (Port Angeles)
Native American Times
Peninsula Daily News - West End
Seattle Post-Intelligencer
Seattle Times
Tacoma News Tribune
The Chronicle
The Northern Light
The Olympian
TVW Washington State Public Affairs Network

Libraries

Anacortes Public Library
Enumclaw Public Library
Jefferson County Library
King County Library System
Kitsap Regional Library
North Olympic Library System - Clallam Bay, Forks, Port Angeles, and Sequim Branch Libraries
Olympia Timberland Library
Orcas Island Public Library
Pierce County Library System
San Juan Library
Seattle Public Library, Govt Publications Department
Sno-Isle Regional Library
Tacoma Public Library
Whatcom County Library

Public Scoping Commenters*

Chuck & Margaret Owens (Peninsula Citizens for the Protection of Whales)
D.J. Schubert (Animal Welfare Institute)
Eric Peterson (EPA)
Naomi Rose (Animal Welfare Institute)
Sue Arnold (California Gray Whale Coalition)
Timothy Ragen (Marine Mammal Commission)
Will Anderson and Tamara Drake (Green Vegans)

* Other public scoping comments were received via electronic mail; however, no mailing addresses were provided for DEIS distribution.

List of Preparers and Agencies Consulted

PREPARER	EDUCATION
Donna Darm NMFS Project Manager	J.D., University of Washington B.S., History, Portland State University
Kate Engel Parametrix Project Manager	M.S., Wildlife Ecology, University of Wisconsin, Madison Post-baccalaureate, Wildlife Science, Oregon State University B.S., Wildlife Science, Oregon State University
Sarah Biegel West Coast Region NEPA Coordinator	M.S., Biological Sciences, Boston University B.S., Biology, University of Notre Dame
Steve Braund Cultural Resources/Ceremonial and Subsistence Resources	M.A., Anthropology, University of Alaska, Fairbanks B.A., Northern Studies/English, University of Alaska, Fairbanks
Kassandra Brown Public Safety	J.D., University of Oregon B.S., Fisheries Resources Management, University of Idaho
Mariann K. Brown Other Wildlife	Post-Graduate Work, Animal Behavior, University of California, Davis B.S., Wildlife Management, Humboldt State University
Jay Brueggeman Other Wildlife	M.S., Wildlife Biology, University of Washington B.S., Wildlife Biology, University of Idaho
Susan Burke Economics/Environmental Justice	Ph.D., Economics, Oregon State University M.S., Economics, University of California, Davis B.S., Business Administration/Finance, California State University, Hayward
Karen Cantillon Technical Editor	B.A., English Literature, John Carroll University
Jenna Friebel Water Quality	M.S., Environmental Engineering and Science, University of Washington B.S., Biology and Environmental Science, Oregon State University
Julie Grialou Other Wildlife	M.S., Wildlife Science, University of Washington B.A., Biological Anthropology, Harvard University
Michael Hall Noise, Aesthetics, Transportation, Public Services	B.A., University of Washington
Erika Harris Social Environment	B.A., Economics, Pacific Lutheran University Certification, Environmental Regulation, University of Washington
Dorothy Kennedy Cultural Resources/Ceremonial and Subsistence Resources	D.Phil., Anthropology, Oxford University M.A., Anthropology, University of Victoria B.A., Anthropology, University of Victoria

PREPARER	EDUCATION
Jeff Laake Gray Whales	Ph.D., Wildlife Science, Colorado State University M.S., Wildlife Science, Utah State University B.S., Wildlife Biology, Colorado State University
Tina Loucks-Jaret Technical Editor	B.S. Environmental Studies, University of Washington B.S. Botany, University of Washington M.S. Technical Communication, University of Washington
Thomas R. Loughlin Gray Whales Other Wildlife	Ph.D., Biology, University of California, Los Angeles M.A., Biology, Humboldt State University B.A., Biology, University of California, Santa Barbara
Dave Mayfield Human Health	M.S., Environmental Health, University of Washington B.S., Biology, University of Kansas
Todd O'Hara Human Health Gray Whales	D.V.M., University of Wisconsin, Madison Ph.D., Pharmacology/Toxicology, The Medical College of Virginia M.S., Biology, Villanova University B.S., Biology, Villanova University
Sue Robinson Human Health	M.S., Environmental Toxicology, Western Washington University B.S., Biology (Marine), Western Washington University
Scott Rumsey Marine Habitat and Species	Ph.D., Biological Oceanography, Scripps Institution of Oceanography B.S., Biology with a marine emphasis, University of California, Los Angeles
Donald Schug Economics/Environmental Justice	Ph.D., Geography, University of Hawaii M.S., Agricultural and Resource Economics, University of Hawaii M.S., Oceanography, University of South Florida
Ann Sihler Technical Editor	B.A., English and German Literature, Pomona College
Steve Stone DEIS Updates and Production and Project Coordination	M.S., Fisheries Science, Oregon State University B.S., Fisheries Science, Oregon State University
Tom Wegge Economics	M.S., Environmental Economics, California State University, Fullerton B.A., Urban Studies, University of Southern California
Dave Weller Gray Whales	Ph.D., Wildlife and Fisheries Science, Texas A&M University M.S., San Diego State University B.S., University of Hawaii
Charlie Wisdom Water Quality	Ph.D., Chemical Ecology, University of California, Irvine B.A., Biology, University of California, San Diego A.A., Biology, Orange Coast College

During DEIS development, NMFS also consulted with the following agencies and organizations: Cascadia Research Collective; Clallam County Environmental Health; Clallam County Sheriff's Department; Makah Tribe; Departamento de Biologia Marina, Universidad Autonoma de Baja California Sur, La Paz, B.C.S., Mexico; Marine Mammal Institute, Oregon State University; NMFS National Marine Mammal Laboratory; NMFS Office of Law Enforcement; NMFS Southwest Fisheries Science Center; NOAA National Marine Sanctuary Program; Northwest Indian Fisheries Commission; U.S. Army; U.S. Bureau of Indian Affairs; U.S. Coast Guard; U.S. Department of the Interior; U.S. Fish and Wildlife Service; Washington Department of Fish and Wildlife; Washington State Department of Health; and Washington State Police.

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Appendix A

Makah Tribe's 2005 Request for a Waiver of the MMPA Take Moratorium (including Needs Statement and 2001 Management Plan)

MAKAH TRIBE

P.O. BOX 115 • NEAH BAY, WA 98357 • 360-645-2201

February 11, 2005

William T. Hogarth, Ph.D.
Assistant Administrator
National Oceanic and
Atmospheric Administration
Room 14636
1315 East-West Hwy
Silver Spring, MD 20910

Re: Makah Tribe's Request for a Waiver of the Marine Mammal Protection Act (MMPA) Take Moratorium

Dear Dr. Hogarth,

Under the 1855 Treaty of Neah Bay, the Makah Tribe secured an express right to hunt whales throughout its usual and accustomed grounds and stations. The Makah Tribe's express whaling rights have not been abrogated by any subsequent statute including the Marine Mammal Protection Act (MMPA). Nevertheless, the Ninth Circuit Court of Appeals has held that, notwithstanding the Makah Tribe's express whaling rights under the Treaty of Neah Bay, the National Oceanic and Atmospheric Administration (NOAA) must waive the MMPA take moratorium before the Tribe may exercise its Treaty whaling rights. *Anderson v. Evans*, 371 F.3d 475 (9th Cir. 2004).

Consider this letter and the attached application the Tribe's formal request for a waiver of the take moratorium under Section 101(a)(3) of the MMPA, 16 U.S.C. § 1371(a)(3), to allow a ceremonial and subsistence (C&S) harvest from the Eastern North Pacific stock of gray whales (*Eschrichtius robustus*) within the Makah Tribe's adjudicated usual and accustomed grounds. *See United States v. Washington*, 626 F.Supp. 1405, 1467 (W.D.Wash. 1985). The total take of gray whales for which the Tribe seeks a waiver is up to 20 gray whales in any five-year period subject to a maximum of five gray whales in any calendar year.

In accordance with Section 101(a)(3) of the MMPA, the Tribe asks you to determine that it is compatible with the Act to waive the moratorium to allow for the taking of whales requested in this letter and attached application, and to adopt suitable regulations and make determinations in accordance with Sections 102, 103, and 104 of the Act. We also ask you to simultaneously undertake a National Environmental Policy Act review of the Tribe's request.

The Tribe believes that approval of this request is consistent with the purposes and policies set forth in Section 2 of the MMPA and is necessary for the United States to fulfill its fiduciary obligations to the Tribe under the Treaty of Neah Bay. As shown in the attached application, the Tribe's requested harvest of gray whales will ensure that gray whales remain a significant functioning element in the ecosystem and will not permit the Eastern North Pacific gray whale stock to fall below its optimum sustainable population.

The Tribe thanks you in advance for your attention to this important matter.

Sincerely,

MAKAH TRIBAL COUNCIL

Ben Johnson Jr.

Ben Johnson, Jr.
Chairman

CC: Rolland Schmitten, U.S. IWC Commissioner
Laurie Allen, Director, NOAA Office of Protected Resources
Karl Gleaves, General Counsel for NOAA/NMFS/OPR
Robert Lohn, NOAA Fisheries Northwest Regional Administrator
Joe Scordino, NOAA Fisheries Northwest Deputy Regional Administrator
David Cottingham, Executive Director, Marine Mammal Commission
Michael Gosliner, General Counsel, Marine Mammal Commission
Stanley Speaks, BIA Northwest Regional Director

APPLICATION FOR A WAIVER OF THE MARINE MAMMAL PROTECTION ACT TAKE MORATORIUM TO EXERCISE GRAY WHALE HUNTING RIGHTS SECURED IN THE TREATY OF NEAH BAY

February 11, 2005

Makah Tribal Council
P.O. Box 115
Neah Bay, WA 98357

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Executive Summary

This document constitutes the application of the Makah Indian Tribe (the "Tribe") under Section 101(a)(3) of the Marine Mammal Protection Act (MMPA), 16 U.S.C. § 1371(a)(3), for a waiver of the moratorium on the taking of marine mammals which would allow the Tribe to conduct a Treaty ceremonial and subsistence (C&S) harvest of up to 20 gray whales from the Eastern North Pacific (ENP) stock in any five-year period, with a maximum of five whales per year. The proposed waiver would be subject to permanent regulations adopted by the Secretary of Commerce under Section 103 of the MMPA, 16 U.S.C. § 1373, which would authorize the National Oceanic and Atmospheric Administration (NOAA) to issue the Tribe a renewable whaling permit of up to five years in duration under Section 104 of the MMPA, 16 U.S.C. § 1374, provided that the Tribe enacts, implements, and enforces Tribal regulations which meet minimum standards necessary to conserve the ENP stock, avoid local depletion, and ensure a safe and humane hunt. These standards will include:

- Limits on the total number of gray whales that may be struck in a calendar year;
- Time and area restrictions designed to avoid any intentional harvest of gray whales comprising the Pacific Coast Feeding Aggregation (PCFA);
- Monitoring and adaptive management measures designed to ensure that any incidental harvest of gray whales from the PCFA remains below an annual allowable bycatch level (ABL) that will be conservatively established by applying the MMPA's potential biological removal (PBR) methodology to a conservative abundance estimate which is based on the number of gray whales that exhibit inter-annual site fidelity to the Oregon to Southern Vancouver Island (ORSVI) survey area;
- Measures that will ensure that the hunt is as humane as practicable consistent with the continued use of traditional hunting methods; and
- Measures to protect public safety.

The Makah Tribe has at least a 1,500-year-old whaling tradition and secured an express right to take whales under Article IV of the 1855 Treaty of Neah Bay. The Tribe's Treaty whaling rights have not been abrogated by the MMPA or any other federal statute. Under well-established case law, these rights are subject to restriction only where necessary to prevent demonstrable harm to a particular stock or species of whales.

Nevertheless, in *Anderson v. Evans*, 371 F.3d 475 (9th Cir. 2004), the Ninth Circuit Court of Appeals decided that the Tribe must obtain a waiver of the MMPA's take moratorium before it may exercise its Treaty whaling rights. The Tribe strongly disagrees with the Court's holding, but is filing this application to provide a legal framework that will allow for long-term exercise of its Treaty whaling rights consistent with the conservation needs of the gray whale. Approval of this waiver request is needed to meet the Tribe's cultural and subsistence needs and to fulfill the

United States government's Treaty and trust obligations to the Tribe.

The population of Eastern North Pacific stock of gray whales is at its historic levels and within its optimum sustainable population (OSP). After accounting for the Makah whale hunt, the total human-caused mortality, which includes aboriginal subsistence harvest by native groups in Russia, will be just over a third of the stock's PBR level of 366 whales. The Scientific Committee of the IWC provided management advice in 2002 that a take of up to 463 whales per year is sustainable for at least the medium term (~30 years). This level of harvest is over 350 percent higher than the average annual joint US-Russian quota of 124 whales per year. Because there is no likelihood that the Makah whale hunt will cause the Eastern North Pacific stock to fall below OSP in the foreseeable future, the Tribe's waiver request is well within the Tribe's rights under the Treaty of Neah Bay and is consistent with the policies and requirements of the MMPA.

For the purposes of this application, the Pacific Coast Feeding Aggregation (PCFA) is defined as any whale found in NOAA's photo-identification database which has been observed south of Alaska from June 1 through November 30 in any year. The PCFA is not a discrete stock of whales for the purposes of the MMPA. Nevertheless, the Tribe has agreed to safeguards that will prevent any intentional harvest of gray whales that exhibit inter-annual site fidelity to the Pacific coast south of Alaska. The Tribe will allow whale hunting only during established gray whale migration periods (December 1 through May 31) and prohibit hunting in gray whale feeding grounds in the Strait of Juan de Fuca.

To minimize the risk of incidental harvest of whales from the PCFA and ensure that gray whales remain a functioning element of the ecosystem, the Tribe in consultation with NOAA will compare photographs of all landed whales with NOAA's photo-identification database for the PCFA. The Tribe will suspend the hunt in a calendar year if necessary to prevent the harvest of whales found in the PCFA database from exceeding an annual allowable bycatch level (ABL). The ABL will be calculated by applying the MMPA's PBR methodology to a conservative abundance estimate based on the number of gray whales that are seen in more than one year in the Oregon-Southern Vancouver Island (ORSVI) survey area between June 1 and November 30.

NOAA should approve the Tribe's request for a waiver and adopt regulations that permit the Tribe to exercise its treaty rights in the manner specified in this application. The proposed waiver is necessary for the United States government to fulfill its legal obligations to the Tribe under the Treaty of Neah Bay, will not disadvantage the ENP stock of gray whales, and will be consistent with the purposes and policies of the MMPA.

Definitions.

Allowable Bycatch Level (ABL): the number of whales from the PCFA that may be taken incidental to a hunt directed at the migratory portion of the ENP stock of gray whales. The ABL is calculated using the MMPA's PBR approach but the minimum population estimate is calculated from the number of previously seen whales in the Oregon-Southern Vancouver Island (ORSVI) survey area.

Harassment: any act of pursuit, torment, or annoyance which— (i) has the potential to injure a marine mammal or marine mammal stock in the wild (referred to as Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavorial patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (referred to as Level B harassment). 16 U.S.C. § 1362(18).

Humane Killing: that method of taking which involves the least possible degree of pain and suffering practicable to the mammal involved. 16 U.S.C. § 1362(4).

Optimum Sustainable Population (OSP): is defined as "with respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element." 16 U.S.C. § 1362(9). NOAA has quantified OSP as a population size which ranges between a stock's maximum net productivity level (MNPL) and its carrying capacity (K). *See* 50 C.F.R. § 216.3.

Oregon-Southern Vancouver Island (ORSVI) survey area: the gray whale survey region from Oregon to Southern Vancouver Island for which abundance estimates of returning whales are used to develop the allowable bycatch level (ABL). This area was identified in Calambokidis et al. (2004) as the appropriate range to evaluate abundance estimates for the purposes of management of a Makah whale harvest and is based on gray whale interchange rates to survey areas adjacent to the Makah U&A.

Pacific Coast Feeding Aggregation (PCFA): any ENP gray whale found in the photo-identification database maintained by NOAA's National Marine Mammal Laboratory (NMML) which has been observed south of Alaska from June 1 through November 30 in any year.

Potential Biological Removal (PBR): the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population 16 U.S.C. § 1362(20). A total level of human-caused mortality that is less than the PBR is considered sustainable and consistent with the MMPA's goal of managing marine mammal stocks to achieve their OSP level. Under 16 U.S.C. § 1362(2), the PBR for a particular marine mammals stock is calculated by taking the product of the following factors: the minimum population of the stock (N_{min}); one-half the maximum theoretical or estimated net productivity rate of the stock at a small population size (R_{max}); and a recovery factor (F_r) between 0.1 and 1.0.

Strike: means any blow or blows delivered to a whale by a harpoon, rifle or other weapon which may result in death to a whale. A harpoon blow counts as a strike if the harpoon is embedded in the whale. Any rifle shot which hits a whale counts as a strike. For the purpose of this request, multiple strikes on a single whale count as a single strike.

Take: as applied to the number of whales that may be harvested, "take" is defined in accordance with the regulations of the International Whaling Commission, "to flag, buoy or make fast to a whale catcher." For all other purposes, "take" is defined according to the definition in the MMPA, which means to harass, hunt, capture, or kill, or attempt to harass, hunt capture, or kill any marine mammal. 16 U.S.C. § 1362(13).

Acronyms.

ABL	Allowable Bycatch Level
C&S	Ceremonial and Subsistence
CV	Coefficient of Variation
ENP	Eastern North Pacific
F_r	Recovery factor
ICRW	International Convention on the Regulation of Whaling
IWC	International Whaling Commission
K	Carrying capacity
km	Kilometers
m	Meters
MMPA	Marine Mammal Protection Act
MNPL	Maximum Net Productivity Level
MRT	Minimum Residency Tenure
MSY	Maximum Sustained Yield
MSYL	Maximum Sustained Yield Level
n	Sample size
N	Population estimate
N_{min}	Minimum population estimate
NEPA	National Environmental Policy Act
NMML	National Marine Mammal Laboratory
NOAA	National Oceanic and Atmospheric Administration

ORSVI	Oregon-Southern Vancouver Island
OSP	Optimum Sustainable Population
PBR	Potential Biological Removal
PCFA	Pacific Coast Feeding Aggregation
R_{max}	Maximum theoretical or estimated net productivity rate of a stock at small population size
SARs	Stock Assessment Reports
U&A	Makah Usual and Accustomed grounds and stations
WCA	Whaling Convention Act

I. Request for Waiver and Proposed Regulations.

This document constitutes the application of the Makah Indian Tribe (the "Tribe") under Section 101(a)(3) of the Marine Mammal Protection Act (MMPA), 16 U.S.C. § 1371(a)(3), for a waiver of the moratorium on the taking of marine mammals which would allow the Tribe to conduct a Treaty ceremonial and subsistence (C&S) harvest of up to 20 gray whales from the Eastern North Pacific (ENP) stock in any five-year period, with a maximum of five whales per year. The proposed waiver would be subject to permanent regulations adopted by the Secretary of Commerce under Section 103 of the MMPA, 16 U.S.C. § 1373, which would authorize the National Oceanic and Atmospheric Administration (NOAA) to issue the Tribe a renewable whaling permit of up to five years in duration under Section 104 of the MMPA, 16 U.S.C. § 1374, provided that the Tribe enacts, implements, and enforces Tribal regulations which meet minimum standards necessary to conserve the ENP stock, to avoid local depletion, and to ensure a safe and humane hunt. The term of the initial permit should coincide with the current aboriginal subsistence quota for gray whales approved by the International Whaling Commission (IWC), which runs though 2007. Future permits would be issued in synchrony with IWC aboriginal quotas, which are currently set at five-year intervals.

As discussed in greater detail in Parts II and III of this application, the Makah Tribe has at least a 1,500-year-old whaling tradition and secured an express right to take whales under Article IV of the 1855 Treaty of Neah Bay. The Tribe's Treaty whaling rights have not been abrogated by the MMPA or any other federal statute. Under well-established case law, these rights are subject to restriction only where necessary to prevent demonstrable harm to a particular stock or species of whales.

Nevertheless, in *Anderson v. Evans*, 371 F.3d 475 (9th Cir. 2004), the Ninth Circuit Court of Appeals decided that the Tribe must obtain a waiver of the MMPA's take moratorium before it may exercise its Treaty whaling rights. The Tribe strongly disagrees with the Court's holding but is filing this application to provide a legal framework that will allow for long-term exercise of its treaty whaling rights consistent with the conservation needs of the gray whale. Approval of this waiver request is needed to meet the Tribe's cultural and subsistence needs and to fulfill the United States government's Treaty and trust obligations to the Tribe.

The Tribe proposes to manage the whale hunt under Tribal regulations which meet the following minimum standards:

A. Number of Gray Whales that May Be Taken.

The Tribe's regulations will limit the number of gray whales that may be "taken," as that term is defined in IWC regulations, to no more than five in any calendar year, and to no more than 20 in any five-year period.[1] In addition, Tribal regulations will limit the number of gray whales that may be "struck," a more inclusive term that encompasses all whales that are "taken," to no

[1] Under the IWC Schedule, the term "take" means to flag, buoy or make fast to a whale catcher.

more than seven in any calendar year.[2] The Tribe's regulations will limit the number of struck and lost whales to no more than three in any calendar year. The number of gray whale takes and strikes allowed by Tribal regulation will be subject to reduction if necessary to meet the international treaty obligations of the United States under the International Convention for the Regulation of Whaling (ICRW) or to prevent the abundance of the ENP stock from falling below its optimum sustainable population level (OSP). Tribal regulations will not allow the taking of any other species of whales except gray whales.

B. Age, Size, and Sex of Gray Whales that May Be Taken.

Tribal regulations will prohibit the striking of a whale calf, or any whale accompanied by a calf.

C. Season When Gray Whales May Be Taken.

The Tribe's regulations will prohibit the striking of a gray whale between June 1 and November 30 of any calendar year. The purpose of this restriction is to prevent the intentional harvest of whales that may be part of the Pacific Coast Feeding Aggregation (PCFA).

D. Manner and Location in which Gray Whales May Be Taken.

The Tribe's regulations will prohibit the striking of a gray whale outside of the Tribe's usual and accustomed (U&A) grounds as adjudicated in *United States v. Washington*, 626 F.Supp. 1405, 1467 (W.D. Wash. 1985). The Tribal regulations will also prohibit the striking of a gray whale within the Strait of Juan de Fuca. Hunting will only occur in the waters of the Pacific Ocean bounded by the following line: a line beginning at the northwestern tip of Cape Flattery running to the Tatoosh Island Lighthouse; from the Tatoosh Island Lighthouse to the buoy adjacent to Duntze Rock; from the buoy adjacent to Duntze Rock following a straight line to Bonilla Point on Vancouver Island but stopping at the Exclusive Economic Zone (EEZ); tracking the EEZ boundary westward to 125° 44'00" longitude; south along 125° 44'00" longitude to 48° 02'15" latitude; east along 48° 02'15" latitude to shore; and then track the shoreline northward to point of origin at Cape Flattery.

To further reduce the risk of local depletion, Tribal regulations will provide for detailed photographic monitoring of all landed whales. As soon as practicable after a successful hunt, in consultation with scientists from NOAA's National Marine Mammal Laboratory (NMML) the Tribe will compare photographs of landed whales with the NMML photo-identification catalog for the Pacific Coast Feeding Aggregation (PCFA), which includes any gray whale that has been photographed south of Alaska between June 1 and November 30 in any year. The Tribe will cease hunting in a calendar year when photographic analysis indicates that suspension of the hunt

[2] For the purposes of this request, the term "strike" means any blow or blows delivered to a whale by a harpoon, rifle or other weapon which may result in death to a whale. A harpoon blow counts as a strike if the harpoon is embedded in the whale. Any rifle shot which hits a whale counts as a strike. (Makah Tribal Council 2001).

is necessary to prevent the number of harvested whales from the PCFA catalog from exceeding an annual allowable bycatch level (ABL) for that year. The ABL will be calculated by applying the MMPA's PBR methodology to a conservative abundance estimate based on the number of gray whales that exhibit site fidelity (i.e., seen in more than one year) in the Oregon to Southern Vancouver Island (ORSVI) survey area between June 1 and November 30.

The Tribe's regulations will also include measures that will ensure that the hunt is conducted in the most humane manner practicable consistent with the Tribe's goal of providing opportunities for a traditional ceremonial and subsistence hunt. To this end, all whales will be harpooned with a toggle-point harpoon with floats attached before being dispatched with a .50 caliber rifle shot to the central nervous system (brain and upper spinal cord). During the 1999 hunt these methods resulted in a time to death of approximately 8 minutes. The Tribe anticipates that the time to death will improve as its hunters gain additional experience.

To address concerns about impacts to nesting seabirds, no whale may be struck within 200 yards of Tatoosh Island or White Rock during the month of May. The Tribal regulations will also include measures to ensure that the hunt is conducted in a manner which is at least as protective of public safety as the measures provided for in the Tribe's 2001 Gray Whale Management Plan (Makah Tribal Council 2001).[3] Further management measures to address public safety and possible impacts to other species may be developed based on the outcome of NOAA's National Environmental Policy Act (NEPA) review of the Tribe's request.

E. Other requirements.

The Tribe's regulations will restrict the use of whale products to local consumption and ceremonial purposes in accordance with section 102(f) of the MMPA. 16 U.S.C. § 1372(f). No whale products will be sold or offered for sale, except that traditional handicrafts (including artwork) made from non-edible whale products may be sold or offered for sale within the United States. The Tribe requests a limited waiver from the MMPA's prohibition on the sale of marine mammal products for the purposes of selling such traditional handcrafts. The requested waiver would be similar to, but more restrictive than, the exemption for Alaska native handicrafts provided in Section 101(b)(2) of the MMPA, 16 U.S.C. § 1371(b)(2).

The Tribe's regulations will include a permit system which provides that no Tribal member may engage in whaling except under the control of a whaling captain who is in possession of a valid whaling permit issued by the Makah Tribal Council. Whaling permits issued by the Council must incorporate and require compliance with all of the requirements of the Tribe's regulations.

Tribal regulations will provide for a training and certification process for all members who

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[3] These measures authorized the discharge of firearms when whaling only when the shooter was within 30 feet of the target area of the whale and the shooter's field of view was clear of all persons, vessels and other objects that could result in injury or loss of human life. The measures also set minimum visibility standards for the hunt. (Makah Tribal Council 2001).

participate in whaling.

Tribal regulations will offer accommodations for a NOAA Fisheries observer during all hunts, including providing the designated observer from NOAA Fisheries with at least 24 hours notice of the issuance of any whaling permit unless the observer is already present on the Makah Reservation. The regulations will also allow NOAA Fisheries to collect specimen material from landed whales, including ovaries, ear plugs, baleen plates, stomach contents, and other tissue samples.

Tribal regulations will include provisions for Tribal monitoring of all hunts and annual reporting of all monitoring data to NOAA Fisheries. At a minimum, Tribal monitoring will include maintaining accurate records of the time, date, and location of all strikes; the body length, fluke width, and sex of all landed whales and any fetus found in a landed whale; and the time to death for all whales killed. As indicated previously, all landed whales will be photographed to allow comparison with the NMML photographic database compiled for the PCFA.

Tribal regulations will include provisions requiring Tribal enforcement of the regulations. The enforcement regulations shall include criminal sanctions, including fines and imprisonment, up to the limits imposed by the Indian Civil Rights Act.

II. Purpose of and Need for the Waiver Request.

The purpose of the Tribe's application for a waiver of the take moratorium is to obtain authorization under the MMPA for a Treaty C&S harvest of up to 20 gray whales in any five-year period from the Eastern North Pacific (ENP) stock, with a maximum of five gray whales per year. As decided by the Ninth Circuit Court of Appeals in *Anderson v. Evans*, 371 F.3d 475 (9th Cir. 2004), a waiver of the MMPA's take moratorium is necessary for the Tribe to exercise its express whaling rights under Article IV of the Treaty of Neah Bay. Approval of this request is needed to satisfy the United States government's obligations to the Tribe under the 1855 Treaty of Neah Bay and the federal trust responsibility, and to fulfill the Tribe's cultural and subsistence needs which are discussed below and in the attached need statement submitted to the IWC in 2002 (Appendix A; Renker 2002).

A. The Tribe's Cultural and Subsistence Needs.

As discussed in further detail in Appendix A, the Tribe has at least a 1,500-year whaling tradition. Whaling was central to the Tribe's way of life, providing a primary means of subsistence as well as essential social and cultural functions.[4] Whaling was so important to the Tribe that it expressly reserved whaling rights in the 1855 Treaty of Neah Bay. Although Makah whaling declined in the decades after the Treaty due to forces beyond the Tribe's control, the Makah people have never forgot their whaling traditions. Over the past two decades, the Tribe has begun to restore its language, songs and dances and many other cultural traditions. The resumption of whaling in the late 1990s has brought the Tribe significant cultural and social benefits as well as a badly needed subsistence resource. Approval of this waiver application, which seeks a harvest of up to five gray whales per year from the ENP stock, would enable the Tribe to continue its cultural renaissance and provide significant nutritional resources to an economically deprived community.

1. The Makah Tribe's Whaling Tradition.

The relationship between the Makah people and whaling is of great antiquity. The Ozette archeological site on the northern Washington coast contains evidence of some 1,500 years of continuous whaling. Archeological and ethnohistorical data demonstrate that the Makah hunted gray whales as well as other whale species. The number of whales taken by Makah whalers varied from year to year. Based on historic documents, it is estimated that Makah whalers averaged about 5.5 whales per year between 1889 through 1892, a time when the gray whale population had already been substantially reduced by non-Indian commercial whaling. Whaling for gray whales occurred during both the fall and spring migrations, with some hunts occurring 30 or more miles from shore.

The Makah hunted whales from giant canoes, approximately 36 feet long and more than 5

[4] The discussion in this section is taken from Renker (2002). Readers are directed to Appendix A for a list of references for this section.

feet wide, which were carved from a single cedar log. Other equipment included mussel-shell harpoons, sealskin floats, fathoms of line made from whale sinew and cedar, and a variety of knives. Whaling equipment and methods were constantly evolving. After contact with Euro-Americans, Makah whalers began to use metal harpoon heads at the ends of their traditional wood harpoons and accepted tows from steamers to and from the whaling grounds.

A whaling crew consisted of a chief, or “whaler,” and seven men. The whaler owned the canoe and the whaling equipment and acted as the sole harpooner. Other crew members included a steersman, a man responsible for managing the lines and buoys, numerous paddlers, and a man who had the unique responsibility of diving into the water and fastening the whale’s mouth shut after the whale was killed.

The whale was initially harpooned behind the front flipper. Once the first harpoon had been driven into the whale and the first set of floats attached, the whale was pursued and killed with a long wooden lance. The process of killing a whale could take up to three to four days. Once killed, the whaling crew had to tow the animal back to land, a process which could take another two days. Whales were butchered according to strict protocols, which identified the sequence of the butchering, the portions of the whale reserved for ceremonial use, and the portions to be distributed to the crew and other village inhabitants.

Positions on whaling crews were restricted to men who could withstand the rigors of intensive ritualized training, possessed the hereditary access to the position and its ritualized knowledge, or underwent a supernatural encounter which engendered the gift of whaling ability. All crew members undertook rigorous ceremonial and spiritual preparations prior to the hunt; the success of the hunt depended as much on the observance of rituals as the strength and skill of the whalers. The families of the whalers were also expected to observe rituals to ensure the safety and success of the hunters.

Whaling was the keystone of traditional Makah society. Makah society was mirrored in the structure of the whale hunt, including ceremonial preparation, the hunt itself, and the ultimate acts of butchering and distribution. Whalers, or headmen, were ranked at the top of the social pyramid. Whaling success translated into physical wealth and social prestige for the headman. Women married to whalers likewise dominated the top of the female status pyramid. Ceremonies to prepare whalers and their families for the hunt provided the Makah with a social framework that contributed to governmental, social, and spiritual stability.

In addition to its cultural and social benefits, whaling provided the Makah with an essential subsistence resource. Archeological studies show that as much as 85 percent of the Makah pre-contact diet could have been composed of whale meat, oil and other food products. Whale blubber and oil also provided an important source of trade goods. Whale products insured that the Makah enjoyed a high standard of living and a diversified economy.

2. The Treaty of Neah Bay.

In the early 19th century, as non-Indian traders and explorers entered the waters of the

Northwest, the Makah experienced increasing demand for whale products. The Makah expanded their trade in whale oil and other whale products in response to this demand, selling whale oil to the Hudson's Bay Company and other trading outfits.

In early 1855, the Makah were approached by the United States government, through Washington Territorial Governor Isaac Stevens, for the purpose of negotiating a treaty of land cession. From the government's perspective, the purpose of the treaty was to gain title to the region's rich lands and resources in order to make way for non-Indian settlement. While the Makah were willing to sell most of their lands to the United States, the Tribe insisted on retaining its rights to harvest the bountiful marine resources upon which it depended for its existence. To gain Makah acceptance of the treaty, Governor Stevens repeatedly insisted that the government did not intend to stop the Makah from whaling, sealing and fishing, but in fact would help them to develop these pursuits.

Much of the official record of the treaty negotiations reflects this dialogue. At the outset of the discussions, Governor Stevens proposed to buy Makah lands and establish a small reservation at the site of present-day Neah Bay. The first Makah chief to speak, Klachote, responded that the treaty must also protect his "right to fish, and take whales and get food when he liked." The next chief, Keh-tchook, seconded this demand. Governor Stevens acceded to the Makahs' demand, replying that "so far from wishing to stop their fisheries, he wished to send them oil kettles, and fishing apparatus." Governor Stevens reassured the Makah:

> I saw the Great Father a short time since and [he] sent me here to see you and give you his mind. The Whites are crowding in upon you and the Great Father wishes to give you your homes. He wants to buy your land and give you a fair price but leaving you enough to live on and raise your potatoes. He knows what whalers you are, how you go far to sea, to take whales. He will send you barrels in which to put your oil, kettles to try it out, lines and implements to fish with — . . . [T]his will be done if we sign it [the treaty]. If it is good I shall send it to the Great Father, and if he likes it he will send it back with his name. When it is agreed to it is a bargain.

Based on the government's assurances that their whaling rights would be protected, the Makah's agreed to sign the 1855 Treaty of Neah Bay, 12 Stat. 939 (Jan. 31, 1855) (Appendix B). The Treaty was ratified, without alterations, on March 8, 1859. From the Makah perspective, the critical clause of the treaty was Article IV, which provides:

> The right of taking fish *and of whaling* or sealing at usual and accustomed grounds and stations is further secured to said Indians in common with all citizens of the United States. . . [emphasis added].

Governor Stevens' promise of government assistance with their whaling, sealing and fishing industries was also a significant inducement to the Makah because it allowed for further expansion of the Tribe's existing whaling and fishing enterprises. Significantly, of all of the many Stevens Treaties -- and of all treaties between the United States and Indian tribes -- the Treaty of

Neah Bay is the only one which expressly secures tribal whaling rights.

3. The Decline of Makah Whaling.

Despite Governor Stevens' promises, the United States failed to provide support for Makah fishing, whaling and sealing. Government assistance emphasized agricultural implements rather than items that could have supported the active components of the Makah's maritime economy. Instead of whaling and fishing tools, the Makah received pitchforks, scythes, hoes and sickles. Since the Makah Reservation was unsuited to cultivation, the Makah converted the tines of the pitchforks into fish hooks, the scythes into blubber knifes, and the sickles into arrowheads.

Federal Indian policy in the late 19th century was devoted to changing the Makah and other Indians from self-sufficient hunter-gatherers into farmers, dependent on the government for tools and instruction. Indian policy was also designed to assimilate Indian people through an education system that prohibited use of Indian languages or the exercise of cultural rituals. Despite the Treaty of Neah Bay's recognition of whaling as an important facet of Makah life, the United States government chose not to support the Tribe's well-developed practice.

Indoctrination in government-run boarding schools also worked against traditional subsistence whaling, as did epidemics and government bans on ceremonial activities. Potlatches and secret societies were prohibited, disrupting the Makah system of proprietary rights over dances, songs, and other ceremonies. At the same time that government policy was aimed at converting the Makah to agriculturalists, Pacific whale populations were declining as a result of increased commercial whaling by non-Indians. In 1854, Captain Charles Scammon discovered the Mexican breeding grounds of the gray whale. Gray whale cows and calves were slaughtered in the breeding lagoons bringing about the decimation of the Eastern North Pacific gray whale stock over the next few decades.

During this time, whale hunting remained the symbolic heart of Makah culture but continued to diminish in frequency as it became cost-prohibitive. As whale populations declined, the Makah shifted their resources to pursue more lucrative seal hunting. By the 1890s, Makah schooners were hunting fur seals along the Washington coast and as far north as the Bering Sea.

In short, boarding-school indoctrination and government acculturation policies, combined with a series of devastating epidemics, drastically changed the delicate and complex social dynamic which had supported the traditional Makah whale hunt. These factors, especially when juxtaposed with the severe decline in whale populations, served to discourage the Makah from making the substantial investments needed to pursue traditional whaling.

4. The Tribe's Present Cultural and Subsistence Need for Whaling.

Despite the decline of whaling, the Makah Tribe's interest in retaining their whaling rights and traditions never dissipated. Families passed on whaling stories, traditions, and secrets. The Makah never stopped educating their children about their family whaling traditions. Public schools on the reservation have included whaling in their curricula since the 1960s, with continuous efforts since 1981. Whaling designs and crests still decorate public buildings and private homes. The whaling displays in the Makah Tribe's museum have kept the tradition of whaling alive.

For the past three decades, the Makah have been engaged in a concerted effort to revive their cultural traditions. The Tribe believes that revival of these traditions is needed to combat the social disruption resulting from the rapid changes of the past century and a half. Teenage pregnancies, high school dropouts, substance abuse problems, and an increasing juvenile crime rate indicate that the Makah community is still in flux and that the enormous social disruption caused by epidemics, boarding schools, and federal acculturation policy is still not over. Entire social, cultural, subsistence, and ceremonial institutions were repressed, eradicated, or decimated; without substitution of structural equivalents.

To reverse these disturbing trends, the Makah have reinstituted numerous song, dance and artistic traditions and operated a program to restore the Makah language to spoken proficiency on the reservation. The Makah Cultural and Research Center has been instrumental in the revival of many cultural traditions. Given the centrality of whaling to the Tribe's culture, a revival of subsistence whaling is necessary for the Makah to complete this spiritual renaissance and repair the damage done to the Tribe's social structure during the years of forced assimilation. A recent survey showed that this view is supported by a majority of Makah households.[5]

Continuation and expansion of subsistence whaling will also help address the socioeconomic deprivation experienced by many tribal members. The seasonal unemployment rate on the Makah Reservation is 51 percent, with almost 49 percent of Makah households living in poverty and 59 percent living in substandard housing. According to the 2000 census, median household income on the reservation is approximately $24,000 compared with $46,000 for Washington state as a whole.

Both historically and today, the Makah have addressed economic deprivation by relying on the sea for subsistence. Currently, 85 percent of Makah households have someone in their household who fishes and 63 percent of these households list fishing as the major occupation in their home. Even households without a fisherman derive food, money, or other goods from a fisherman who is a relative or a friend. Fish is a medium of exchange on the reservation and all Makah households participate in reciprocal networks that involve fish at some level of exchange.

A majority of Makah households use traditional Makah foods at least once a week. These include such unique traditional foods as fermented salmon eggs, smoked fish heads and backbones, halibut cheeks and gills, and dried fish. According to a recent analysis, the Makah's annual per capita consumption of fish is 126 pounds, some eight times higher than for the average American. While seafood comprises 55 percent of the Makah diet, it represents only 7 percent of the diet of the average American.

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[5] According to the 2000 census, there are 1356 Makahs living in 471 households on the Reservation. Another 1,117 Makahs live off the Reservation.

Information regarding the Tribe's successful whale hunt in 1999 illustrates the potential for wide-ranging cultural and subsistence benefits from whaling. Thirty-nine percent of households indicated that they participated in whaling-related ceremonial activities, 30 percent of households have cooked whale meat, and 81 percent of Tribal members reported having eaten whale products. An overwhelming number of community members were present when the first whale was landed at Neah Bay in 1999 and 80 percent attended the Tribal celebration of the first whale hunt. Most Makah surveyed felt that the restoration of whaling had improved social and cultural conditions on the Reservation. These data demonstrate that the Makah are fully capable of restoring subsistence whaling to a central place in their culture, economy, and way of life.

B. The Tribe's Recent Efforts to Exercise Its Whaling Rights.

Gray whales were first given international protection from commercial whaling in 1937. By 1993, NOAA determined that the Eastern North Pacific (ENP) stock of gray whales had recovered to near its estimated original population size. 58 Fed. Reg. 3121 (Jan. 7, 1993). NOAA removed the ENP stock from its list of endangered and threatened species on June 16, 1994. 59 Fed. Reg. 21,094.

Once NOAA determined that the protections of the Endangered Species Act were no longer necessary, the Tribe notified NOAA that it wished to reinitiate a ceremonial and subsistence gray whale hunt. Although the Tribe had an express treaty right, the Tribe chose to move forward in cooperation with the United States government and seek an aboriginal subsistence whaling quota from the IWC. In 1996, NOAA agreed to seek IWC approval of a quota of five gray whales per year for the Tribe. The Tribe agreed in turn that if the IWC granted the quota, the Tribe would use the whales only for subsistence purposes and would cooperatively manage the hunt with the Federal government. The United States presented the Tribe's quota request to the IWC at its 1996 meeting but the IWC failed to approve the proposal.

In 1997, NOAA entered into a new agreement with the Makah Tribe. To address public concerns about so-called "resident" whales, the new agreement provided that whaling would occur only in the "open waters of the Pacific Ocean." NOAA also published an environmental assessment (EA) which concluded that the Makah whaling proposal would result in no significant environmental impacts.

At the 1997 IWC meeting, the Tribe's quota request was included as part of a joint United States-Russian proposal for a block quota of 620 whales over the five year period from 1998 through 2002. The United States and Russia explained to the IWC that 20 whales from this joint quota would be made available to the Makah Tribe subject to a cap of five whales per year. On October 23, 1997, the IWC approved the joint quota request by consensus. The IWC renewed the joint quota for another five years (2003-2007) at its 2002 meeting.

After the IWC approved the quota, the Makah Tribe adopted a gray whale management plan that included measures to ensure a humane hunt, such as requiring the use of a high-powered rifle, as well as training requirements, a permit system, and monitoring and enforcement provisions. In 1998, NOAA published a domestic quota of five gray whales per year for the Makah Tribe. 63 Fed. Reg. 16,701 (Apr. 6, 1998). Tribal whalers began preparing for the hunt in 1998 but no hunting occurred until the spring of 1999. In May 1999, a Tribal whaling crew hunted on four occasions and struck one gray whale. Once struck, the whale was dispatched eight minutes later with a high-powered rifle. The whale was towed back to Neah Bay where ceremonies were held, the whale was butchered, and the meat and blubber were distributed and consumed throughout the community. No additional whale hunting occurred in 1999. Two crews hunted on at least seven different occasions during the spring of 2000 but no whales were struck or landed.

On June 9, 2000, a divided panel of the Ninth Circuit reversed an earlier district court decision and held that NOAA violated the National Environmental Policy Act by entering into an agreement with the Tribe committing the government to support the Tribe's whaling proposal before the government had completed an EA. *Metcalf v. Daley,* 214 F.3d 1135, 1145 & n.3 (9th Cir. 2000). The majority did not identify any specific deficiency in the government's environmental analysis. As a remedy, the Court ordered NOAA to "suspend implementation" of the cooperative agreement, and "prepare a new EA." *Id.* at 1146.

The Tribe suspended its hunt immediately after the Ninth Circuit's ruling. NOAA rescinded the cooperative agreement and began work on a new EA. In response to public comments, NOAA consulted with the Tribe and expressed concerns about the impact of the hunt on the Pacific Coast Feeding Aggregation (PCFA), a group of approximately 200 to 250 gray whales that forage in the summer along the Pacific coast rather than migrating to more northerly feeding grounds in the Bering Sea. Although NOAA found no scientific basis to treat the PCFA as a discrete stock of marine mammals, NOAA advised the Tribe that it intended to evaluate the impacts of the Tribe's hunt on the PCFA. The Tribe addressed these concerns by revising its Management Plan to limit the number of whales that could be struck outside of whale migration periods or in the Strait of Juan de Fuca to a maximum of five strikes during the years 2001 and 2002 combined (or 2.5 strikes per year) – the low end of the PBR limit for the PCFA calculated by NOAA in its 2001 EA (NMFS 2001). The Tribe also adopted additional measures in its revised Management Plan to address public concerns about the safety of the hunt (Makah Tribal Council 2001).

After the Tribe adopted its revised Management Plan, NOAA published a second EA which found that the Makah whale hunt, conducted in accordance with the revised Management Plan, would have no significant environmental impacts (NMFS 2001). After the publication of the second EA, NOAA and the Tribe negotiated a new cooperative agreement and on December 7, 2001, NOAA published a quota of five gray whales for the Makah Tribe for the year 2002. 66 Fed. Reg. 64,378 (Dec. 13, 2001).

The new EA and quota were challenged in *Anderson v. Evans*, 371 F.3d 475 (9th Cir. 2004). The United States District Court for the Western District of Washington upheld NOAA's issuance of the quota and the second EA. However, the Ninth Circuit Court of Appeals reversed. The Ninth Circuit held that, notwithstanding the Tribe's whaling rights under the Treaty of Neah Bay, the Secretary of Commerce must waive the MMPA moratorium on taking marine mammals and a issue a permit under the MMPA before NOAA can authorize a tribal harvest of gray whales for ceremonial and subsistence purposes. In addition, the court held that NOAA should have prepared an Environmental Impact Statement (EIS) before authorizing a Makah gray whale quota because there were questions over the local impacts of the hunt on the gray whales that feed off of the Washington coast. The Court emphasized that it was *not* holding that the Tribe's treaty right to take whales had been abrogated, but only that NOAA must follow the MMPA waiver and/or permit process before permitting the Tribe to exercise that right. This waiver application is intended to address the requirements imposed by the *Anderson* decision.

III. Applicable Law.

A. Treaty of Neah Bay.

The Treaty of Neah Bay (Appendix B) is the only treaty between the United States and an Indian Tribe which expressly reserves the right to hunt marine mammals. Article IV of the Treaty of Neah Bay provides:

> The right of taking fish *and of whaling* or sealing at usual and accustomed grounds and stations is further secured to said Indians in common with all citizens of the United States. . .

12 Stat. at 939 (emphasis added).

The Tribe's whaling and sealing rights under the Treaty of Neah Bay have not been abrogated by the MMPA. "Absent explicit statutory language, [the Supreme Court] has been extremely reluctant to find congressional abrogation of treaty rights." *Washington v. Washington Commercial Passenger Fishing Vessel Ass'n*, 443 U.S. 658, 690 (1979). In order to abrogate Indian treaty rights, Congress must make its intention to abrogate those rights "clear and plain." *United States v. Dion*, 476 U.S. 734, 738-39 (1986). Thus, where a statute does not expressly abrogate Indian treaty rights, "[w]hat is essential is *clear evidence* that Congress *actually considered* the conflict between its intended action on the one hand and Indian treaty rights on the other, and *chose* to resolve that conflict by abrogating the treaty." *Id.* at 740 (emphasis added); *see also Minnesota v. Mille Lacs Band*, 526 U.S. 172, 202 (1999).

There is no evidence that Congress was even aware of the Makah Tribe's unique treaty right to take marine mammals when it enacted the MMPA, much less that it *chose* to abrogate those rights. On the contrary, neither the MMPA nor its legislative history even mention Indian treaty rights until Congress amended the MMPA in 1994. Far from abrogating those rights, the 1994 Amendments expressly preserved them. Section 14 of the 1994 Amendments provides: "Nothing in this Act including any amendments to the Marine Mammal Protection Act of 1972 made by this Act alters or is intended to alter any treaty between the United States and one or more Indian Tribes." Pub. L. 103-238, § 14 (Apr. 30, 1994); *see* Historical and Statutory Notes to 16 U.S.C. § 1361. Congress' stated intent in enacting this disclaimer was to "reaffirm that the MMPA does not in any way diminish or abrogate protected Indian treaty fishing or hunting rights." S. Rep. No. 220, 103rd Cong., 2nd Sess, 1994 USCCAN 514, 534. The language and legislative history of the MMPA thus evince absolutely *no* Congressional intent to abrogate the Tribe's Treaty right to take marine mammals.

It has been argued that the MMPA abrogates Indian treaty rights because it provides an exemption only for Alaska Natives but not other native groups. This argument misses the mark because Alaska Natives have no *treaty* rights to take marine mammals. The enactment of a special provision granting Native Alaskans special hunting rights cannot by negative implication abrogate the rights of other native groups that were already guaranteed such rights by treaty. In

United States v. Bresette, 761 F. Supp. 658, 663 (D. Minn. 1991), it was held that a similar Alaska Native exception in the Migratory Bird Treaty Act (MBTA) did *not* abrogate Indian *treaty* rights.[6]

Under well-established case law, the Tribe's unabrogated rights to take marine mammals are subject to regulation only where "necessary for conservation" of a particular marine mammal stock or species. *Washington v. Washington Passenger Fishing Vessel Assn.*, 443 U.S. 658, 682 (1979) ("treaty fishermen immune from all regulation save that required for conservation"); *Puyallup Tribe v. Department of Game*, 391 U.S. 392, 401 n.14 (1968) (power of the State to impose time and area restrictions on treaty right fishing is "measured by whether regulations are 'necessary' for the conservation of fish"); *Tulee v. Washington*, 315 U.S. 681, 684-85 (1942) (State may regulate the exercise of treaty fishing rights only if regulations are "necessary for the conservation of fish"). Federal courts have applied the conservation necessity principle to both state and federal regulations. *Anderson*, 371 F.3d at 497, n.21; *see also Midwater Trawlers Cooperative v. Dept. of Commerce*, 282 F.3d 710, 718-19 (9th Cir. 2002) (United States must employ conservation necessity principle when setting tribal fishing allocations); *United States v. Williams*, 898 F.2d 727, 730 & n.4 (9th Cir. 1990) ("government [has] the burden of establishing the conservation necessity of state *and federal* wildlife laws against members of tribes with hunting and fishing treaty rights").

The "conservation necessity" principle is not weakened by the "in common with" language in the Treaty. The purpose of that language was to secure access for non-Indians to the Tribe's usual and accustomed grounds, not to provide a basis for restricting the Tribe's hunting and fishing rights. *United States v. Washington*, 384 F. Supp. 312, 357 (W.D. Wash. 1974) (nothing to indicate that Tribe was "told that its existing fishing activities or tribal control over them would in any way be restricted or impaired by the treaty"), *aff'd,* 520 F.2d 676 (9th Cir. 1975), *cert. denied*, 423 U.S. 1086 (1976).

In the Indian treaty rights context, the term "conservation" is defined restrictively to mean "those measures which are reasonable and necessary to the *perpetuation of a particular run or species*." *Id.* at 342 (emphasis added). The *government* has the "burden of proof" in demonstrating a "conservation necessity" exists. *Id.* To carry its burden, the government must show that:

- a "specific statute or regulation is required to prevent demonstrable harm to the actual conservation of fish,"

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[6] The Bald Eagle Protection Act (BEPA) which was held to abrogate treaty rights in *United States v. Dion*, 476 U.S. 734, 740-43 (1986), is distinguishable from the MMPA. The BEPA contains a sweeping prohibition on the taking of eagles with a narrow exception allowing the Secretary of the Interior to issue permits allowing eagles to be taken "for the religious purposes of Indian tribes." *Dion*, 476 U.S. at 740, citing 16 U.S.C. § 668a. The legislative history of the BEPA clearly showed that Congress was aware of Indian on-reservation hunting of eagles, considered such hunting to be part of the problem calling for the legislation, and "expressly chose to set in place a regime in which the Secretary of the Interior had control over Indian hunting, rather than one in which Indian on-reservation hunting was unrestricted." *Dion*, 476 U.S. at 743. By contrast, the MMPA provides numerous exceptions to the moratorium on taking marine mammals and contains *no* provisions addressing Indian *treaty* harvests.

- "existing tribal regulation or enforcement is inadequate to prevent demonstrable harm to the actual conservation of fish," and,

- "the conservation required cannot be achieved to the full extent necessary . . . by other less restrictive means or methods."

Id. at 415. Since *United States v. Washington,* these standards have been accepted and applied as established law. *See Midwater Trawlers,* 282 F. 3d at 718-19; *Shoshone-Bannock Tribes v. Fish and Game Comm'n*, 42 F.3d 1278, 1283 (9th Cir. 1994); *Williams*, 898 F.2d at 730; *United States v. Oregon*, 718 F.2d 299, 304 (9th Cir. 1983); *United States v. Michigan*, 653 F.2d 277, 279 (6th Cir.), *cert. denied*, 454 U.S. 1124 (1981); *Lac Courte Oreilles Band v. Wisconsin*, 668 F. Supp. 1233, 1236, 1241 (W.D. Wis. 1987); *Mille Lacs Band v. Minnesota*, 952 F. Supp. 1362, 1380 (D. Minn.), *aff'd*, 124 F.3d 905 (8th Cir. 1997), *aff'd*, 526 U.S. 172 (1999).

In sum, the Treaty of Neah Bay has not been abrogated and provides the Makah Tribe with special whaling rights not shared by other United States citizens. NOAA may regulate the exercise of these rights only if it can demonstrate that its regulations are necessary for conservation. To satisfy the "conservation necessity" standard, federal regulations restricting the Tribe's whaling rights may be promulgated only where necessary to preserve a particular species or stock of whales and, taking existing Tribal regulations into consideration, where they are the least restrictive means available to achieve this purpose.

B. Federal Trust Responsibility.

Courts have long recognized that a "special relationship" exists between the United States and Indian tribes which provide the Constitutional basis for legislation, treaties, and Executive Orders that grant unique rights to Indian tribes. *Morton v. Mancari*, 417 U.S. 535, 551-53 (1974). This relationship imposes fiduciary duties upon the government to faithfully carry out treaty and other legal mandates enacted for the benefit of Indian tribes. *Seminole Nation v. United States*, 316 U.S. 286, 296-97 (1942) *Cherokee Nation v. Georgia*, 30 U.S. 1(5 Pet.) (1831); *see also* Chambers, *Judicial Enforcement of the Federal Trust Responsibility*, 27 Stan. L. Rev. 1213 (1975); Cohen, *Handbook of Federal Indian Law* 220-21 (1982 ed.). These fiduciary obligations are especially strict where they involve implementation of treaty provisions:

> In carrying out its treaty obligations with the Indian tribes, the Government is something more than a mere contracting party. Under a humane and self-imposed policy which has found expression in many acts of Congress and numerous decisions of [the Supreme] Court, it has charged itself with moral obligations of the highest responsibility and trust.

Seminole, 316 U.S. at 296-97.

The scope of the Federal trust relationship is broad and applies to all federal agencies. *Pyramid Lake Paiute Tribe v. United States Navy*, 898 F.2d 1410, 1420 (9th Cir. 1990); *Nance v.*

Environmental Protection Agency, 645 F.2d 701, 711 (9th Cir.), *cert. denied*, 454 U.S. 1081 (1981). The United States government has an obligation to protect tribal property, including Indian hunting and fishing rights. *Lincoln v. Vigil*, 508 U.S. 182, 194 (1993) ("The law is 'well established that the Government in its dealings with Indian tribal property acts in a fiduciary capacity.'") (quoting *United States v. Cherokee Nation*, 480 U.S. 700, 707 (1987)); *Pyramid Lake*, 898 F.2d at 1420. Federal agencies have a duty to "represent the Tribe's interests forcefully despite [their] other representative obligations."[7] *White Mountain Apache Tribe v. Hodel*, 784 F.2d 921, 925 (9th Cir.) *cert. denied*, 479 U.S. 1006 (1986).

The requirements of the general trust responsibility are enhanced by the language and negotiating history of the Treaty of Neah Bay. Article IV of the Treaty of Neah Bay "secures" to the Tribe the right of whaling at usual and accustomed grounds and stations. In the treaty negotiations, the Tribe was "invited by the white negotiators to rely and in fact did rely on the good faith of the United States to protect that right." *Fishing Vessel*, 443 U.S. at 667. The government's "promise that the treaties would protect [the Tribe's] source of food and commerce were crucial in obtaining the Indian's assent." *Id.* at 676. In short, NOAA has a special obligation to consider and protect the treaty whaling rights of the Makah Tribe when it considers the Tribe's request for a waiver from the MMPA take moratorium.

C. International Convention on the Regulation of Whaling.

The International Convention on the Regulation of Whaling (ICRW) was signed in 1946 to "provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry." 62 Stat. 1716 (Dec. 2, 1946). The ICRW establishes the IWC, which is composed of one member from each signatory government, whose primary function is to adopt whaling regulations known as the "Schedule." The Schedule and all amendments thereto are deemed to be part of the ICRW itself. Arts. I, III, V. Amendments to the Schedule may not allocate quotas to any group of whalers. Art. V, § 2.

The original Schedule prohibited the harvest of gray whales, "except when the meat and products of such whales are to be used exclusively for local consumption by the aborigines." 62 Stat. at 1723. Since the late 1970s, aboriginal subsistence whaling has been subject to quotas and other regulations adopted by the IWC. Paragraph 13 of the Schedule sets strict guidelines for the setting of aboriginal subsistence whaling quotas. For stocks at or above a maximum sustained yield level (MSYL), aboriginal subsistence catches are permitted so long as total removals do not exceed 90 per cent of maximum sustained yield (MSY). For stocks below the MSYL but above a

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[7] These trust obligations have been implemented in Secretarial Order No. 3206, issued June 5, 1997 and signed by the Secretaries of Interior and Commerce, which directs NOAA to carry out its responsibilities under the Endangered Species Act in a manner that harmonizes the Federal trust responsibility to tribes, tribal sovereignty, and NOAA's statutory missions, so as to avoid or minimize the potential for conflict and confrontation. Executive Order 13175, dated November 6, 2000, requires agency policy making to be guided by principles of respect for Indian treaty rights and responsibilities that arise from the unique legal relationship between the Federal Government and Indian tribal governments. On issues relating to treaty rights, the Executive Order directs each agency to explore and, where appropriate, use consensual mechanisms for developing regulations.

certain minimum level, aboriginal subsistence catches are permitted so long as they are set at levels which will allow whale stocks to move to the MSYL.[8]

In 2002, the IWC renewed the aboriginal subsistence gray whale quota for the Eastern North Pacific stock and authorized the taking of up to 620 gray whales between 2003 and 2007, with a maximum of 140 in any one year. By bilateral agreement between the United States and the Russian Federation, up to 20 whales may be taken by the Makah Tribe over the five year quota period, with a maximum of five whales in any one year. The IWC Schedule also prohibits the taking of a gray whale calf or a gray whale accompanied by a calf.

The United States has implemented the ICRW through the Whaling Convention Act (WCA). 16 U.S.C. §§ 916 *et seq.* Pursuant to the WCA, NOAA has adopted aboriginal subsistence whaling regulations which are set out at 50 C.F.R. Part 230. The regulations permit whaling captains designated by a Native American whaling organization which has been recognized by NOAA to engage in subsistence whaling in accordance with IWC quotas and regulations. 50 C.F.R. §§ 230.5, 230.6. NOAA has entered into three cooperative agreements with the Tribe (in 1996, 1997, and 2001) recognizing the Makah Tribal Council as a Native American whaling organization and permitting the Council to issue permits to whaling captains consistent with IWC quotas and regulations.

D. MMPA.

1. Policies and Purposes of the Act.

The MMPA was adopted in 1972 out of concern that "certain species and population stocks of marine mammals are, or may be, in danger of extinction or depletion as a result of man's activities." 16 U.S.C. § 1361(1). It is the goal of the MMPA that marine mammal "species and population stocks should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part." *Id.* § 1361(2). Consistent with this major objective, species and population stocks "should not be permitted to diminish below their optimum sustainable population." *Id.* The MMPA defines the term "optimum sustainable population" to mean:

> with respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and health of the ecosystem of which they form a constituent element.

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[8] Paragraph 10(a) of the Schedule defines a "Sustained Management Stock" (SMS) as any "stock which is not more than 10 per cent of Maximum Sustainable Yield (hereinafter referred to as MSY) stock level below MSY stock level, and not more than 20 per cent above that level; MSY being determined on the basis of the number of whales."

16 U.S.C. § 1362(9).

2. Waiver and Permit Requirements.

Section 101(a) of the MMPA imposes a moratorium on the taking of marine mammals, except under regulations and permits adopted by the Secretary of Commerce under the Act. 16 U.S.C. § 1371(a). However, the Secretary may waive the moratorium if he determines, "on the basis of the best scientific information available," in consultation with the Marine Mammal Commission, and "having due regard for the distribution, abundance, breeding habits and times and lines of migratory movements" of the animals in question, that a waiver is "compatible" with the MMPA. *Id.* § 1371(a)(3)(A). To waive the moratorium, the Secretary must also "be assured that the taking of such marine mammals is in accord with sound principles of resource protection and conservation as provided in the purposes and policies" of the Act. *Id.* A waiver of the moratorium requires the promulgation of regulations and in some cases may also require the issuance of permits. *Id.*

The process for adopting regulations authorizing the taking of marine mammals is set out in Section 103 of the MMPA, 16 U.S.C. § 1373. Such regulations must be promulgated "on the basis of the best scientific evidence available" and in consultation with the Marine Mammal Commission. 16 U.S.C. § 1373(a). The regulations must "insure that such taking will not be to the disadvantage of those species and population stocks, and will be consistent with the purposes and policies" of the Act. *Id.* In prescribing such regulations, the Secretary must give full consideration to all relevant factors, including the effect of such regulations on existing and future levels of marine mammal species and population stocks; the government's existing international treaty and agreement obligations; the marine ecosystem and related environmental considerations; the conservation, development and utilization of fishery resources; and the economic and technological feasibility of implementation. *Id.* § 1373(b).

MMPA take regulations may include restrictions on the number of animals which may be taken by permit in any calendar year; the age, size or sex of the animals which may be taken; the season or other time period within which animals may be taken; and the manner and locations in which animals may be taken. 16 U.S.C. § 1373(c). Any such regulations must be made "on the record after opportunity for an agency hearing on both the Secretary's determination to waive the moratorium . . . and on such regulations." *Id.* § 1373(d). In addition to other requirements imposed by law with respect to agency rulemaking, the Secretary must publish and make available to the public before or concurrent with the publication in the Federal Register of his intention to prescribe regulations a statement setting forth:

(1) the estimated existing levels of the species and population stocks of the marine mammal concerned;

(2) the expected impact of the proposed regulations on the optimum sustainable population of such species or population stock;

(3) the evidence before the Secretary upon which he proposes to base such

regulations; and

(4) any studies or recommendations made by or for the Secretary or the Marine Mammal Commission that relate to the establishment of such regulations.

Id. The process for issuing permits is set out in Section 104 of the MMPA, 16 U.S.C. § 1374. Any permit issued under Section 104 of MMPA must be consistent with the regulations promulgated under Section 103 and specify the number and kind of animals which are authorized to be taken, the location and manner in which they may be taken, the period during which the permit is valid, and any other terms and conditions deemed appropriate by the Secretary. *Id.* § 1374(b). To issue a permit, the Secretary must also determine that the proposed manner of taking will be humane.

3. The Potential Biological Removal (PBR) Approach to Achieving Optimum Sustainable Population Levels.

In 1994, Congress amended the MMPA to incorporate the potential biological removal (PBR) approach to measuring effects of marine mammal takes on the optimum sustainable population (OSP) of stocks and populations. The need for the PBR approach was brought on by the decision in *Kokechik Fishermen's Ass'n v. Secretary of Commerce*, 839 F.2d 795 (D.C. Cir. 1988), which held that NOAA could not issue a permit for the incidental taking of one marine mammal species in a commercial fishery where the fishing operation also incidentally took other species and insufficient information existed to determine the population status of those species.

Following *Kokechik*, Congress amended the MMPA to establish a five-year interim exemption from the Act's prohibition on taking marine mammals incidental to most U.S. commercial fishery operations, while directing NOAA to use the five-year period to collect data on marine mammal stocks and the extent of commercial fishery interactions with those stocks, and to develop a proposed regime to govern interactions between commercial fishing operations and marine mammals after the exemption expired.

NOAA issued its proposed regime along with a legislative environmental impact statement in November 1992. As explained by the House Committee which reported out the 1994 Amendments to the MMPA:

> The goal of the proposal – like the goal of the Act – was to have all marine mammal stocks reach their optimum sustainable population [OSP]. NMFS proposed that levels of incidental take quotas be determined based on the concept of "Potential Biological Removal" (PBR): the maximum number of animals, excluding natural mortalities, that may be removed from a population without affecting its ability to reach or maintain OSP.

H.R. Rep. No. 439, 103rd Cong., 2d Sess. (Mar. 21, 1994).

Congress enacted the PBR approach into law in the 1994 Amendments to the MMPA.

Pub. L. 103-238, 108 Stat. 544 (Apr. 30, 1994). The 1994 Amendments incorporate the following definition into Section 3 of the Act:

> The term "potential biological removal level" means the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. The potential biological removal level is the product of the following factors:
>
> (A) The minimum population estimate of the stock.
>
> (B) One-half the maximum theoretical or estimated net productivity rate of the stock at a small population size.
>
> (C) A recovery factor of between 0.1 and 1.0.

16 U.S.C. § 1362(20).

The 1994 Amendments also required NOAA to produce stock assessment reports (SARs) for each marine mammal stock which occurs in waters under the jurisdiction of the United States. These SARs must be based on the best scientific information available and describe for each stock, *inter alia*, its geographic range, including any seasonal or temporal variation in its range; an estimate of the stock's minimum population size, its current and maximum net productivity rates and current population trend; an estimate of the annual human-caused mortality and serious injury of the stock by source; and an estimate of the potential biological removal level for the stock, describing the information used to calculate it, including the recovery factor. 16 U.S.C. § 1386(a). SARs must be revised at least once every three years.[9] *Id.* § 1386(c).

In accordance with the 1994 Amendments to the MMPA, NOAA currently evaluates all human-caused mortalities in relation to a stock's PBR level. The PBR approach is NOAA's established management strategy for achieving the primary goal of the MMPA, which is to prevent any marine mammal stock from being reduced below its OSP level.[10]

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[9] Congress addressed the issue of takings incidental to commercial fisheries by requiring the development of incidental take plans designed to reduce incidental takes of stocks below the PBR level. *See* 16 U.S.C § 1387(f). Subsistence harvests of marine mammals by Alaska Natives were not affected by the PBR calculations. *Id.* § 1386(e).

[10] NOAA's most recent stock assessment for the Eastern North Pacific stock of gray whales is for 2003 (Angliss and Lodge 2004). The stock assessment is available at: http://www.nmfs.noaa.gov/prot_res/readingrm/MMSARS/sar2003akfinal.pdf

IV. Life History and Population Status of the Eastern North Pacific Stock of Gray Whales.

A. General Life History and Distribution.

Gray whales (*Eschrictius robustus*) are baleen whales classified in the suborder Mysticeti and are the only species in the monotypic family Eschrichtiidae. The generic name, *Eschrichtius*, was given in recognition of Daniel Eschrict, a 19th century zoologist, and the specific name *robustus* is Latin for “oaken” or “strong.” Gray whale nomenclature is further reviewed in Rice and Wolman (1971) and the fossil record and evolution of gray whales is described in Barnes and McLeod (1984).

Gray whales historically existed in both the Pacific and Atlantic Oceans. The Atlantic population was extirpated by the end of the 17th Century (Mead and Mitchell 1984). Gray whales in the Pacific Ocean are divided into two distinct stocks: the Eastern North Pacific gray whale stock (sometimes referred to as the Chukchi-California stock), which is fully recovered from exploitation by commercial whaling and migrates from the Bering and Chukchi Seas to Baja Mexico (Swartz 1986); and the critically depleted Western North Pacific stock (also referred to as the “Korean-Okhotsk” stock) which migrates along the east coast of Asia (Rice and Wolman 1971).

Gray whales are easily distinguished from other whales. Gray whales are gray in coloration and have patches of lice and barnacles, giving them a mottled appearance. They lack a dorsal fin. However, they have a dorsal hump which is followed by a series of knobs or “knuckles” which are distinctly visible as they arch. Adult gray whales are between 11 and 15 m in length, with females being larger than males.

B. Migration.

The Eastern North Pacific stock of gray whales feeds in the summer in the northern Bering and Chukchi Seas and winters off of Baja California, Mexico (Scammon 1874). Wintering gray whales are found within the lagoons and protected waters of the western Baja Peninsula and, to some extent, along the Mexican mainland and in the Gulf of California (Swartz et al. 2000). The northbound migration begins with newly pregnant females, adult males, anestrous females and immature whales of both sexes which leave the wintering grounds around mid- to late-February (Poole 1984) and begin to arrive in the Bering Sea from late-March through May (Braham 1984). Females with calves are the last to leave southern waters and depart between late-March and May (Swartz et al. 2000). Females with calves travel more slowly than whales without calves to accommodate nursing as well as the slower swimming speed of the calves (NMFS 2001). Cow-calf pairs enter the Bering Sea from May through June (Braham 1984).

The southbound migration also occurs in phases. Gray whales are moving out of the Bering Sea by late-November, beginning with near-term pregnant females and followed by oestrus females, mature males, and then juveniles of both sexes (Swartz et al. 2000). Gray whales begin to arrive in the waters off Baja in late-December and reach highest densities by mid-February (Jones and Swartz 1984). The gray whale migration is approximately 10,000 km each way (Scammon 1874).

The timing of migration at certain points along the Pacific coast is more thoroughly presented in Pike (1962), Swartz (1986), Rugh et al. (1999), and Swartz et al. (2000). According to this data, southbound whales are present along the Washington coast beginning in early December, peaking around 5 January, and ending in the first week of February. Northbound whales are present from late-February into June (NMFS 2001).

On both the northbound and southbound migration, gray whales tend to follow the shoreline, although they also traverse larger expanses of open water. In Washington, northbound migrants averaged 11.9 km from shore (Green et al. 1995), while southbound migrants have been seen up to 47 km from shore (Shelden et al. 1999), with an average distance of 25.2 km from shore (Green et al. 1995). A hypothesis explaining why gray whales are farther offshore during the southbound migration in Washington is that gray whales may take a more direct route from central Vancouver Island to the mouth of the Columbia River, instead of taking the longer route following the coast line (Green et al. 1995). Also, gray whales may feed during the northward migration and therefore travel closer to the coast, while during the southbound migration they already have a positive energy balance when they depart from the Arctic feeding grounds.

C. Reproduction.

Both male and female gray whales become sexually mature between 5 and 11 years of age, with an average of 8 years (Rice and Wolman 1971). Mature females breed in two year cycles, producing a calf every other year (Swartz 1986). Breeding occurs during the southward migration, with a mean conception date of 5 December (Rice and Wolman 1971). Females that have not successfully bred may enter a second estrus phase approximately 40 days later (Rice and Wolman 1971). Gestation lasts 418 days (Rice 1983) with a median birth date of 27 January (Rice et al. 1981). Calves are approximately 4.57 m long at birth (Rice 1983). The sex ratio of calves is 1:1 (Jones and Swartz 1984; Rice and Wolman 1971). Gray whale calves wean in August (Rice and Wolman 1971).

D. Feeding Behavior and Prey.

Gray whales employ a variety of foraging methods including benthic suction, engulfing, and skimming and feed on a wide variety of prey (Nerini 1984). Nerini (1984) reviewed reports on gray whale stomach analyses and listed the presence of over 90 genera. Gray whales primarily feed on benthic invertebrates. In the Arctic, the most common prey item is benthic tube-dwelling amphipods which can be found at densities as high as 23,780 individuals per square meter (Nerini 1984). The benthic foraging behavior is disruptive to the benthos (Oliver and Slattery 1985) and may be considered a specialized type of niche construction (Odling-Smee et al. 1996). The gray whales' ability to use different foraging methods and their ability to prey upon a variety of species may account for their more rapid recovery from commercial whaling in comparison with other great whale species (Nerini 1984; Moore et al. 2001).

Gray whales do not feed significantly during their southbound migration (Perryman and Lynn 2002). Oliver et al. (1983) did not find compelling evidence of benthic feeding in the winter grounds. There are reports of mud plumes observed on the calving grounds (e.g., Norris et al. 1977), but for the most part, it appears that gray whales fast during the winter (Perryman and Lynn 2002) and can lose 11-29% of their weight between the south- and northbound migrations (Rice and Wolman 1971).

E. Natural and Human-Related Mortality.

Natural mortality of gray whales includes predation by killer whales (*Orcinus orca*) (Baldridge 1972; Goley and Straley 1994), disease, entrapment in ice (IWC 2003), starvation, and old age. NOAA Fisheries maintains a stranding database of marine mammals. The average number of gray whales reported as stranded between 1995 and 1998 was 38 per year (Angliss and Lodge 2004). In 1999 and 2000, the stranding rate increased to 273 and 355, respectively (Angliss and Lodge 2004). The actual cause of death for these stranded whales is largely unknown (IWC 2003). Since 2000, the stranding rate has returned to pre-1999 levels (Angliss and Lodge 2004).

Eastern North Pacific gray whales have been traditionally hunted by Eskimos and Chukotka Natives in the Arctic, and by several Tribes from the Aleutians to California (O'Leary 1984). Shore-based commercial whaling occurred in California and Baja California from about the mid-1800's to 1900 (Henderson 1984; Sayers 1984). Modern whaling from ocean-going vessels occurred from 1914 to 1946 and was pursued by the United States, Japan, Norway, and the Soviet Union (Reeves 1984). Gray whales were afforded some protection from commercial harvest by nations that were signatory to the 1937 International Agreement for the Regulation of Whaling and received more complete protection under the 1946 International Convention for the Regulation of Whaling (ICRW) (Reeves 1984). The ICRW banned all commercial harvest of gray whales while continuing to allow for aboriginal subsistence use. From 1959 until 1969, 316 gray whales were taken under scientific research permits issued by the United States Bureau of Commercial Fisheries (now called NOAA Fisheries) (Rice and Wolman 1971; Perryman and Lynn 2002).

Data on aboriginal subsistence gray whale harvest is available on the IWC website (http://www.iwcoffice.org/_documents/table_aboriginal.htm). The Soviet Union operated a large whale catcher ship on behalf of Chukotka Natives between 1967 and 1991, harvesting gray whales at an average rate of 165 gray whales per year from 1985 through 1991. After the collapse of the Soviet Union, aborigines in Chukotka resumed hunting using traditional methods from their own small craft, and averaged an annual harvest of 96 gray whales from 1994 through 2002. Aboriginal hunters in Alaska harvested one gray whale in 1985, two in 1986, one each in years 1988 and 1989, and two in 1995. The Makah Tribe harvested one gray whale in the spring of 1999. As indicated in Section III.C, in 2002, the IWC renewed the gray whale quota for the Eastern North Pacific stock and authorized the taking of up to 620 gray whales between 2003 and 2007, with a maximum of 140 in any one year. By bilateral agreement between the United States and the Russian Federation, up to 20 whales may be taken by the Makah Tribe over the five year quota period, with a maximum of five whales in any one year (IWC 2002).

Aside from aboriginal harvest, other sources of human-related mortality and serious injury of gray whales include ship strikes (average of 1.2 gray whales per year) and incidental catch in commercial fisheries (average of 8.9 gray whales per year) (Angliss and Lodge 2004).

F. Abundance.

The Eastern North Pacific gray whale stock is considered to be one of the best studied cetacean populations in the world (Swartz 1986) largely because of the stock's close proximity to shore throughout its range. Because the stock migrates close to shore and has a predictable migration window, it is feasible to conduct shore-based sighting surveys to estimate abundance. Gray whales have been surveyed during their southbound migration at or near Granite Canyon, California since 1967 (Buckland and Breiwick 2002; Angliss and Lodge 2004). The raw count data is then transformed into an abundance estimate after accounting for the following factors: a correction for missed whales; a correction for whales passing during periods when no observers are present; differential sightability by observers, pod size, distance offshore, and environmental conditions; errors in pod size estimation; covariance within the corrections due to variable sightability by pod size; and a correction for a difference between diurnal and nocturnal travel rates (Hobbs and Rugh 1999; Rugh et al. 2003).

The population estimate used in the most recent NOAA Stock Assessment Report (Angliss and Lodge 2004) for Eastern North Pacific gray whales is 26,635 (CV = 10.06%; 95% log normal confidence interval = 21,878 to 32,427), which was based on the 1997/98 southbound migrant observation season (Hobbs and Rugh 1999). The population had an intrinsic growth rate of 2.5% (SE = 0.3%) from 1967/68 to 1995/96 (Buckland and Breiwick 2002), despite the annual removal of up to 165 whales by, or on behalf of, Russian natives. Similar abundance surveys were also conducted in the 2000/2001 and 2001/2002 seasons which resulted in abundance estimates of 18,761 (CV = 10%; 95% log-normal confidence interval = 15,249 to 22,812) and 17,414 (CV = 10.06%; 95% log-normal confidence interval = 14,322 to 21,174), respectively (Rugh et al. 2002). Rugh et al. (2003) recalculated the three most recent abundance estimates due to a new computer program for matching sightings and the use of an alternative observation station in 1998 (due to a storm washing out an access road to the usual observation station). The revised estimates are: 27,958 in 1997/98 (CV = 10.21%; 95% log-normal confidence interval = 22,901 to 34,131), 18,246 in 2000/01 (CV = 9.36%; 95% log-normal confidence interval = 15,195 to 21,910), and 16,848 in 2001/02 (CV = 9.49%; 95% log-normal confidence interval = 13,995 to 20,283). The corrected 2001/02 estimate reported in Rugh et al. (2003) is the most reliable and current abundance estimate for this stock, and will be used in the remainder of this document rather than the 1997/98 abundance estimate reported in the most recent NOAA Stock Assessment Report (Angliss and Lodge 2004).

Trends in gray whale calf production have been monitored using three methods: surveying for calves from shore and from aircraft in central California during the northbound migration (Perryman et al. 2002; Perryman et al. 2004); counting calves from shore at Granite

Canyon, California, during the southbound migration (Shelden and Rugh 2001); and conducting aerial and vessel surveys for calves in the breeding lagoons of Baja California (Urban et al. 2003). Calf production is used in modeling population dynamics of gray whales (Wade and Perryman 2002). Gray whale calf production has also been correlated with the distribution of seasonal ice in the Arctic (Perryman et al. 2002).

Wade and Perryman (2002) calculated the carrying capacity (K) for this stock to be approximately 22,000 gray whales. Therefore, the population likely surpassed its carrying capacity in the late 1990's when it reached an estimated abundance of almost 28,000 whales (Rugh et al. 2003). The increased stranding rate observed in 1999 and 2000 (Le Boeuf et al. 2000; Angliss and Lodge 2004), as well as the low calf production observed over this time period (Le Boeuf et al. 2000; Perryman et al. 2002) were probably symptoms of the fact that the Eastern North Pacific stock of gray whales had exceeded its carrying capacity. The stranding rate has returned to normal levels (Angliss and Lodge 2004) as has calf production. The 2004 calf production estimate was greater than any other recorded (Perryman et al. 2004). As noted by Perryman et al. (2004), the ENP population might actually be higher than the most recent abundance estimates because some animals may not have migrated as far south as Granite Canyon in 2000/01 or 2001/02 (Rugh et al. 2003).

G. Pacific Coast Feeding Aggregation.

Most gray whales from the Eastern North Pacific stock migrate north of the Aleutian chain to feed during the summer and fall. However, some gray whales do not make a full migration and have been observed from Kodiak, Alaska to California during non-migratory periods (Calambokidis et al. 2003). Whales in this group arrive and depart from their wintering grounds concurrently with the overall population that migrates to the Arctic (Calambokidis et al. 2002a). Pike (1962) referred to this group as "summer residents." Because the term "summer resident" is a misnomer, NMFS (2001) referred to this group as the Pacific Coast Feeding Aggregation (PCFA). For the purposes of this request, the "PCFA" is defined as any whale found in the photo-identification database maintained by NOAA's National Marine Mammal Laboratory (NMML) which has been observed south of Alaska from June 1 through November 30 in any year.

Photo-identification studies of gray whales in the PCFA have been undertaken since 1970 (Hatler and Darling 1974) using unique markings on the sides of the gray whale which are revealed as the whales arch (Darling 1984). Darling (1984) hypothesized that gray whales seen along the coast of British Columbia were apart of a larger 'northwest coast' group that numbered at least 100 animals. Calambokidis et al. (2002a) reported that there were approximately 180 gray whales in the PCFA based on a mark-recapture abundance estimate for 1998. Calambokidis et al. (2002b), using a similar approach, reported an abundance estimate for the PCFA of 322 gray whales for 2001; and reported approximately 270 gray whales for 2002 (Calambokidis et al. 2003) (both papers only use whales seen after June 1 because whales that are seen prior to that date are typically never seen again). Calambokidis et al. (2004) used a dataset from 1998-2003 from California to Northern Vancouver Island and whales observed after June 1 and used an open population model approach to derive an abundance estimate of 200 gray whales (CV = 10.3%) for

2003, with a 2003 estimate of 176 whales (CV = 11.6%) based strictly on whales that were seen in multiple years.

In addition to the utility of photo-identification for mark-recapture population analyses and abundance estimates, the ability to identify individual gray whales through photo-identification also provides an opportunity to assess movement, tenure, and site fidelity to the Pacific coast south of Alaska. Those gray whales from the PCFA that have longer interannual sighting histories also tend to be seen in multiple survey regions throughout the PCFA (Calambokidis et al. 2004). As an example of the wide-ranging movements made by PCFA whales, a single whale observed in Kodiak, Alaska in 2002 had previously been seen along the west coast of Vancouver Island in 1999, as early as 1995 in the Cape Caution, BC area, and as early as 1992 in the Clayoquot Sound, BC survey area (Calambokidis et al. 2003). Another whale observed off southern Vancouver Island on 6 July 2003 was later seen in Kodiak on 9 August 2003; corresponding to a direct route movement of 1,104 nautical miles in 34 days (Calambokidis et al. 2004)

Calambokidis et al. (2004) reported that the length of time a whale was observed within a season proved to be a valuable tool in understanding the overall dynamics of the PCFA. A minimum residency tenure (MRT), defined as the time between first and last dates photographed within a year, was calculated to examine the likelihood that a particular whale would be seen the following year. Sixty-eight percent of the whales with a MRT of one week or less were seen during July-September, well outside the migration time period. Whales with longer MRTs in their first year observed were more likely to return in subsequent years. The authors suggested that the mechanism for whales with longer MRTs, and thus higher probability of returning the following year, is likely related to the foraging success that they encounter during the previous year.

Calambokidis et al. (2004) noted that while it makes logical sense when comparing interchange rates of gray whales between survey regions south of the Aleutian Island chain that immediately adjacent survey areas show stronger interchange rates in comparison with interchange rates between survey areas further to the north or south of the site, these results also suggest that individual gray whales regularly return to particular feeding areas. Gray whales in the PCFA were most likely to be re-sighted in adjacent survey area, thus indicating fidelity to an area that is smaller than the PCFA region as a whole, but larger than a single survey region (Calambokidis et al. 2004). The area to the north of the Makah U&A (i.e., the Southern Vancouver Island survey area) as well as the survey area to the south of the Makah U&A (i.e., the Oregon survey area) exhibit the highest degree of interchange. Thus, the authors recommended combining these regions as the appropriate geographic range for assessing local impacts and establishing subquotas for the PCFA (Calambokidis et al. 2004). The three survey regions of Oregon, Northern Washington and the Strait of Juan de Fuca (Makah U&A), and Southern Vancouver Island make up the combined survey area are referred to in this document as the ORSVI survey area.

No genetic differences have been detected between the PCFA and the overall migratory population (Steeves et al. 2001). Steeves et al. (2001) reported that there was a male bias in the

PCFA of 1.7 to 1 (males to females; n = 16), although given the small sample size the bias was not considered to be statistically significant. Ramakrishnan et al. (2001) reported a statistically significant male bias in the PCFA of 1.8 to 1 (males to females; n = 45). The potential explanations of the observed sex bias is that either females are feeding elsewhere in the PCFA and are not being sampled by researchers or that the PCFA is not a separate, closed population (i.e., a population that is experiencing only internal recruitment) (Ramakrishnan et al. 2001). Lang et al. (2004) proposed that the reason for the high genetic diversity observed in samples collected during the summer from Western North Pacific gray whales was the dispersal of males from the Eastern North Pacific gray whale stock into Western North Pacific gray whale feeding grounds. Using both simulations and empirical evidence, Ramakrishnan et al. (2001) reject the hypothesis that the PCFA is a maternal genetic isolate and that both the number of haplotypes and the diversity of haplotypes found in the PCFA is greater than other baleen whale populations of similar size. The level of haplotypic diversity in the PCFA (0.93; Ramakrishnan et al. 2001) is comparable to the haplotypic diversity seen in the Eastern North Pacific stock of gray whales (0.95 $\pm$ 0.02; LeDuc et al. 2002).

Given the best available information, NOAA has managed the PCFA as part of the Eastern North Pacific stock of gray whales (Swartz et al. 2000; Angliss and Lodge 2004). The IWC recognizes the existence of a feeding aggregation of gray whales along the Pacific Coast south of Alaska, but likewise continues to manage the Eastern North Pacific stock of gray whales as a single stock (IWC 2000). However, to avoid local depletion of a feeding aggregation in which individuals show site fidelity to the region and thereby address the MMPA policy that gray whales remain a “significant functioning element of the ecosystem,” 16 U.S.C. § 1361(2), the Tribe’s waiver request contains management measures, including time and area restrictions and annual bycatch level (ABL) subquotas, designed to minimize impacts to those whales that exhibit inter-annual site fidelity to the Pacific coast south of Alaska.

V. Expected Impact Of The Requested Waiver.

A. Effects on the Eastern North Pacific Stock of Gray Whales.

One of the primary goals of the MMPA is to maintain marine mammal populations at or above an optimum sustainable population (OSP). 16 U.S.C. § 1361(2) and (6). OSP is defined as "with respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element." 16 U.S.C. § 1362(9). NOAA has quantified OSP as a population size which ranges between a stock's maximum net productivity level (MNPL) and its carrying capacity (K). *See* 50 C.F.R. § 216.3.

Wade and Perryman (2002) completed an assessment of the Eastern North Pacific gray whale population that incorporated the time series from 1967/68 to 2001/02. They used four different scenarios using the abundance estimates as well as: (1) using all the calf estimates, (2) using none of the calf estimates, (3) using all of the calf estimates except the 1980 and 1981 estimates, and (4) using all of the calf estimates plus an assumed value in 2002 (which was not available at the time of the analysis), to estimate the carrying capacity to be 22,610 (90% CI = 19,830 to 28,470), 21,740 (90% CI = 19,480 to 35,430), 22,110 (90% CI = 19,840 to 26,880), and 22,590 (90% CI = 20,020 to 30,280), respectively for each scenario. For the purposes of the Tribe's waiver request, K will be expressed as a range between 21,740 and 22,610 animals (the lowest and highest values reported among the four scenarios).

Historically, MNPL has been expressed as a range of values (generally 50 to 70 percent of K) determined theoretically by estimating the stock size in relation to the pre-exploitation stock size, which would produce the maximum net increase in population. 42 Fed. Reg, 12,010 (Mar. 1, 1977). In 1977, the mid-point of this range, 60 percent of K, was used to determine whether dolphin stocks in the eastern tropical Pacific Ocean were depleted. 42 Fed. Reg. 64,548 (Dec. 27, 1977). In 1980, NOAA used the 60 percent value in the final rule to govern the taking of marine mammals as bycatch to commercial fishing operations. 45 Fed. Reg. 72,178 (Oct. 31, 1980). More recently, in its 2000 final rule to designate the Cook Inlet stock of beluga whales (*Delphinapterus leucas*) as depleted under the MMPA, NOAA used 60 percent of K as the value to calculate MNPL. 65 Fed. Reg. 34590 (May 31, 2000).

Using the upper and lower range of the values for carrying capacity in Wade and Perryman (2002) and assuming that MNPL = 0.6*K, the MNPL for the Eastern North Pacific stock of gray whales is between 13,044 and 13,566. Hence the OSP for the Eastern North Pacific Stock is a range between 13,044 and 22,610 animals. The most recent abundance estimate (i.e., from the 2001/02 southbound migration season) for the Eastern North Pacific stock of gray whales is 16,848 (CV = 9.49%; 95% log-normal confidence interval = 13,995 to 20,283) (Rugh et al. 2003). Therefore, the Eastern North Pacific gray whale stock is currently above MNPL and is within OSP. Using the abundance estimates reported in Wade and Perryman (2002) and Rugh et al. (2003), the Eastern North Pacific stock of gray whales has been consistently at or above MNPL since the 1979/80 abundance estimate, and it is important to note that during this time period this stock has undergone sustained harvest by, or on behalf of, aboriginal groups. During the late 1990s, the stock probably exceeded the high end of the OSP range.

The IWC has likewise concluded that the ENP stock of gray whales remains a Sustained Management Stock. As indicated in Section III.C. above, the IWC manages whale stocks in relation to their maximum sustained yield level (MSYL), a concept which is analagous to the MMPA concept of MNPL (the difference being that MSYL considers the age and sex structure of the harvest). In 2002, the IWC Scientific Committee conducted a comprehensive assessment of gray whale stocks and concluded that there was essentially zero probability that the Eastern North Pacific stock was below its MSYL (Wade and Perryman 2002; IWC 2003).

As explained in greater detail in Section III.D.3 above, the 1994 amendments to the MMPA adopted the potential biological removal (PBR) approach for evaluating human-caused mortality to marine mammal stocks. The PBR is defined in the Act as "the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population" 16 U.S.C. § 1362(20). The advantage of managing marine mammals using the PBR approach is that it provides a mechanism for achieving the MMPA goal of managing stocks to reach an OSP level where multi-year population trend data is not available (Wade 1998). A total level of human-caused mortality that is less than the PBR is considered sustainable and consistent with the MMPA's goal of managing marine mammal stocks to achieve their OSP level.

Under 16 U.S.C. § 1362(2), the PBR for a particular marine mammals stock is calculated by taking the product of the following factors: the minimum population of the stock (N_{min}); one-half the maximum theoretical or estimated net productivity rate of the stock at a small population size (R_{max}); and a recovery factor (F_r) between 0.1 and 1.0. This relationship is expressed in Equation 1 below:

$$PBR = N_{min} * 0.5R_{max} * F_r \qquad (1)$$

The "minimum population estimate" refers to an "estimate of the number of animals in a stock that: (A) is based on the best available scientific information on abundance, incorporating the precision and variability associated with such information; and (B) provides reasonable assurance that the stock size is equal to or greater than the estimate" 16 U.S.C. § 1362(27). Wade and Angliss (1997) use the following equation (Equation 2) to calculate N_{min} from an abundance estimate:

$$N_{min} = N/\exp(0.842*[\ln(1+CV(N)^2)]^{1/2}) \qquad (2)$$

Wade and Angliss (1997) also provide recommendations on choosing the recovery factor, ranging from 0.1 to 1.0, to be used in different scenarios. A recovery factor of 0.1 is to be used as the default recovery factor when a stock is listed as an endangered species under the Endangered Species Act (ESA). A recovery factor of 0.5 should be used for stocks of an unknown status or for stocks that are listed as threatened under the ESA (or as depleted under the MMPA). A recovery factor greater than 0.5, up to and including a value of 1.0, should be used: (1) when the stock is known to be within OSP; (2) the stock has an unknown status, but is increasing; or (3) when a stock is not listed under the ESA and is undergoing removals by aboriginal hunters.

Using the most recent available and corrected abundance estimate for the Eastern North Pacific stock of gray whales from the 2001/02 southbound migration season of 16,848 (CV = 9.49%; 95% log-normal confidence interval = 13,995 to 20,283) (Rugh et al. 2003), and inserting it into Equation 2, the N_{min} is calculated to be 15,557. While 0.04 is the default R_{max} value for cetaceans when there is inadequate information on life history parameters (Wade and Angliss 1997), NOAA's 2003 Stock Assessment Report for gray whales uses an R_{max} value of 0.047 for the Eastern Northern Pacific stock based on the extensive literature published on the stock's population dynamics (Angliss and Lodge 2004). This literature indicates that there is a 90% probability that the true value of R_{max} is greater than 0.047, a value based on the lower 10th percentile of an estimate derived from an age- and sex-structured model (Wade 2002). The proper recovery factor to be used for this stock is 1.0, since the Eastern North Pacific stock of gray whales is not listed under the ESA and has been undergoing a steady or declining level of removals by aboriginal hunters (Wade and Angliss 1997; NMFS 2001; Angliss and Lodge 2004). Inserting the values for N_{min} of 15,557, the R_{max} of 0.047, and the F_r of 1.0 into Equation 1, the PBR for the Eastern North Pacific stock of gray whales is 366. This value is less than, but more current and accurate than, the PBR value of 575 whales reported in NOAA's 2003 Stock Assessment (Angliss and Lodge 2004) which was based on the uncorrected and outdated 1997/98 abundance estimate.

Angliss and Lodge (2004) estimate the annual average human-related mortality and serious injury of Eastern North Pacific gray whales is 107 animals. This annual average accounts for aboriginal harvest (97 gray whales; data from years 1996-2000), incidental bycatch in commercial fisheries (9 gray whales; data from 1990-2000), and ship strikes (1 gray whale; data from 1996-2000). This estimate of human-caused mortality is less than one-third of the calculated PBR for this stock (366 gray whales). Substituting the annual average Russian allocation of the IWC gray whale quota -- an average of 120 whales per year -- for the value of 97 (based on the conservative assumption that the average quota will be harvested each year), the estimated annual average human-related mortality and serious injury would increase to 130 gray whales (120 from aboriginal harvest; 9 from bycatch; 1 from ship strike). This hypothetical estimate of human-caused mortality is roughly one-third of the calculated PBR for this stock (366 whales).

Any additional human-caused mortality resulting from the Tribe's waiver request will be insignificant in relation to the PBR level for the Eastern North Pacific stock. The Tribe's waiver request includes a ceiling of seven strikes per year and 35 strikes over any five year period. Based on the worst case scenario that each whale that is struck but not landed will die (i.e., 0% chance of survival of struck and lost whales), the greatest estimated annual average human-related mortality would increase from 130 to 137 (127 mortalities resulting from harvest; 9 from bycatch; 1 from ship strike), which still provides a buffer of 229 gray whales between the total level of human-caused mortality and the PBR of 366 whales.

It is also important to note that the Scientific Committee of the IWC provided management advice in 2002 that a take of up to 463 whales per year (the lower of the 5th percentiles of Q_1) is sustainable for at least the medium term (~30 years) (IWC 2003). This level of take is over 350 percent higher than the average annual joint US-Russian quota of 124 whales per year as well as a conservative estimate of all human-caused mortality in a given year.

B. Effects on the Pacific Coast Feeding Aggregation.

For the purposes of this request, the PCFA is defined as any Eastern North Pacific gray whale found in the photo-identification database maintained by NOAA's National Marine Mammal Laboratory (NMML) which has been observed south of Alaska from June 1 through November 30 in any year. Although the PCFA is not a separate stock under the MMPA, the Tribe's waiver request is designed to prevent any depletion of whales that exhibit inter-annual site fidelity to the ORSVI gray whale management area and thereby assure that gray whales remain a "significant functioning element" of the local ecosystem. See 16 U.S.C. § 1361(2). The Tribe's waiver request would accomplish this goal by restricting the hunting season to the migration period (December 1 through May 31) and by prohibiting any hunting in the Strait of Juan de Fuca where gray whales are known to feed. Because no hunting of gray whales will be permitted between June 1 and November 30, and the hunt will not occur in the inside waters of the Strait of Juan de Fuca, those whales exhibiting inter-annual site fidelity to the Pacific coast south of Alaska will not be subject to any intentional harvest under the Tribe's request.

By themselves, these time and area restrictions should reduce impacts to levels that will eliminate any significant risk of local depletion. While gray whales that are from the PCFA may be present at certain times between December 1 through May 31 within the Pacific Ocean area of the Makah U&A and therefore might be subject to incidental harvest under the Tribe's waiver request, the proportion of PCFA whales that will be potentially subject to harvest will be significantly diluted by the much larger migrating population. Assuming that whales from the PCFA are randomly intermixed with the overall stock during the entire migration period and throughout the migration corridor, by dividing the most current abundance estimate of the PCFA of 200 whales (for year 2003; Calambokidis et al. 2004) by the most current abundance estimate for the stock of 16,848 (for season 2001/02; Rugh et al. 2003), there is only a 1.19% chance that any gray whale taken in a Makah whale hunt will be part of the PCFA.

Previous survey data suggests that whales from the PCFA are not randomly intermixed with the overall ENP stock during the latter part of spring migration, and that during the month of May as many as 13 percent of gray whales seen off the north Washington coast may be part of the PFCA (Calambokidis et al. 2000). Assuming a "worst case" scenario, if the Tribe strikes seven whales each year and every one of these whales is struck during the month of May, as many as five whales from the PCFA could be killed over a five-year period.

Accordingly, to provide an added margin of safety, the Tribe will take the following steps to ensure that the incidental take of whales from the PFCA will not reduce the number of whales that exhibit site fidelity to the Pacific coast south of Alaska:

First, as soon as practicable after a successful hunt and in consultation with NMML scientists, the Tribe will photograph the left and right flanks of all harvested whales and compare these photos with the NMML photographic catalog to determine if a harvested whale was part of the PCFA. Calambokidis et al. (1994) provide an example of a stranded gray whale successfully matched to a photographic catalog composed of live individuals. The NMML catalog includes all gray whales that have been photographed in surveys conducted south of Alaska from June 1 through November 30 of any year.

Second, the Tribe will cease hunting in a calendar year if, based on this photographic analysis, suspension of the hunt is necessary to prevent the number of whales harvested from the PCFA catalog from exceeding an annual allowable bycatch level (ABL) for that year. The ABL for the PCFA will be calculated by applying the MMPA's potential biological removal (PBR) methodology to a conservative estimate of the number of gray whales seen in more than one year in the Oregon-Southern Vancouver Island (ORSVI) gray whale survey area and is mathematically defined in Equation 3 below:

$$ABL = N_{min}(ORSVI) * 0.5R_{max} * F_r \qquad (3)$$

These additional measures are highly conservative because the incidental harvest of gray whales from the PCFA photographic catalog, which now includes 477 individual whales observed south of Alaska from June 1 through November 30 from 1998-2003 (Calambokidis et al. 2004), is limited by an ABL derived from a much smaller subset of whales – those whales seen in more than one year within the ORSVI gray whale survey area. In addition, application of an ABL on an annual basis provides a further check against local impacts, because the PBR methodology normally permits averaging of human-caused mortality over a three-year time period (Wade and Angliss 1997).

Calambokidis et al. (2004) used an open population model to incorporate several years of photo-identification work from the PCFA to estimate abundance from California to northern Vancouver Island (200 gray whales; CV = 0.103). The authors further divided the overall PCFA abundance estimate to only consider whales that have been seen in previous years to estimate the abundance of whales that may exhibit inter-annual site fidelity to the overall feeding range of the PCFA (176 gray whales; CV = 0.116). The authors also analyzed the abundance of whales that may exhibit inter-annual site fidelity to the ORSVI gray whale management area (150 gray whales; CV = 0.137). This smaller management area was selected based on similar interchange rates between the survey regions and it includes and incorporates all of the Makah U&A. The authors then provide an abundance estimate that only considers whales seen in multiple years within the ORSVI region (122 gray whales; CV = 0.168). As stated in Calambokidis et al. (2004) "…it is both logical and reasonable to use ORSVI as the region for abundance estimation in setting quotas for a harvest of whales from the [Makah U&A] region."

NMFS (2001) used a closed population model, a recovery factor of 0.5 and 1.0, and two abundance estimates (one included observations in California, and the other did not) for the PCFA to calculate a range of PBR estimates for the entire PCFA which ranged from 2.5 to 6.0 animals per year. The reason cited in NMFS (2001) for using a reduced recovery factor when it calculated the lower range for its PBR estimate for the PCFA was to take a conservative approach of treating the feeding aggregation as a separate management unit. Since that time, there have been new research studies released including an open population analysis using survey data collected from multiple years by Calambokidis et al. (2004) and a more recent genetic analysis (Ramakrishnan et al. 2001). Because the PCFA is part of the same ENP stock, the recovery factor should be the same as for the overall ENP stock. Unlike the proposal reviewed in NMFS (2001), the Tribe's current request takes a more conservative approach regarding impacts to the PCFA. The Tribe will not be conducting hunts from June 1 through November 30, thereby eliminating intentional harvest of whales from the PCFA, and the Tribe proposes using an abundance estimate, converted to an N_{min}, based on the number of returning whales to the ORSVI survey area to calculate an ABL to account for incidental harvest of PCFA whales during the migration period.

The applicable annual ABL will be calculated as follows. We use the 2003 abundance estimate that only considers whales seen in more than one year in the area from Oregon to southern Vancouver Island (122), the most conservative abundance estimate provided in Calambokidis et al. (2004), to calculate an N_{min} of 106 (using Equation 2). An R_{max} of 0.047 is used because the best available science shows that the PCFA is part of the Eastern North Pacific stock of gray whales (Swartz et al. 2000; Angliss and Lodge 2004). A recovery factor of 1.0 is used because: (1) the best available science shows that the PCFA is part of the Eastern North Pacific stock of gray whales (Swartz et al. 2000; Angliss and Lodge 2004), a recovered non-listed stock for which Angliss and Lodge (2004) use a recovery factor of 1.0; (2) the abundance estimates are calculated from an open population model which incorporate multiple years of survey effort; (3) the PCFA area south of Alaska for which the abundance estimate is based has been truncated to address local depletion around the Makah U&A (i.e., ORSVI); and (4) the abundance estimate is based only on whales seen in multiple years (i.e., whales potentially showing site fidelity to the region). Using Equation 3 and inserting an N_{min} of 106, an R_{max} of 0.047, and an F_r of 1.0, the resulting applicable annual ABL is calculated to be 2.49.

Under the Tribe's waiver request, the applicable ABL would be recalculated using the above methodology to reflect the most current survey data. The proposed calculation methodology is highly conservative. For comparison, if one used the 2003 abundance estimate for all of the whales seen in the PCFA (200 whales), which would be converted to an N_{min} of 184 whales (using Equation 2), the ABL would be 4.32 (using Equation 3). Nevertheless, the Tribe proposes to apply the ABL for the smaller ORSVI gray whale survey area and any harvested gray whale will be compared with the NMML photographic catalog for the entire PCFA, not just those whales seen in ORSVI.

In short, given the remote chances of harvesting a single PCFA whale (much less the chance of harvesting two) in the Pacific Ocean during the migration time period and the Tribe's commitment to cease hunting for the remainder of the calendar year to prevent an ABL for that year from being exceeded, the Tribe's overall harvest activities will not result in local depletion or prevent the gray whale from remaining a significant functioning element of the Washington coast ecosystem.

C. Effects on individual whales.

1. Lethal Takes.

A maximum of seven whales will be struck in any year. The Tribe is committed to making every effort to land a whale once it has been struck. During the Makah whaling seasons in 1999 and 2000, there were no whales that were struck and lost and in 1999, the one whale that was struck was landed (i.e., 100% efficiency). Efficiency is defined as the number of landed whales divided by the number struck (for the purpose of this discussion, there can be multiple strikes on an individual whale; but no more than seven different whales will be struck in any one calendar year).

The Alaska Eskimo Whaling Commission uses a qualitative assessment of the likelihood of survival of a bowhead whale (*Balaena mysticetus*) that has been struck and lost. Hunters report the chance of survival of struck and lost whales as being: "excellent" or "lived;" "good," "fair," or "probably lived;" "poor" or "probably died;" "died;" or "unknown" (Philo et al. 1993). Accurate accountability of struck and lost whales and assigning survival rates are important in determining IWC quotas and in modeling whale population dynamics (Suydam et al. 1995).

The Tribe's waiver request is based on the highly conservative assumption that all individual whales that are struck and lost will have a 0% chance of survival (in terms of considering the MMPA PBR approach). The Tribe will cease hunting activities when seven strikes occur in a calendar year, or when the take of photo-identified PCFA whales approaches the ABL, whichever comes first. Therefore, for the purposes of evaluating the Tribe's request, no more than seven whales per year could be killed. The Tribe's regulations will limit the number of struck and lost whales to no more than three in any calendar year. Under no circumstances will the Tribe allow a strike on a gray whale calf or a gray whale accompanied by a calf.

The hunt will be monitored by biologists from Makah Fisheries Management and from NOAA Fisheries and the Tribe anticipates a thorough, yet still qualitative, approach to assigning survival rates of struck and lost whales to the IWC and NOAA for the purposes of population modeling. If the Tribe were to have a struck and lost whale, the hunt would be evaluated by the Tribe, and the Tribe would implement any improvements as necessary.

In addition to working to minimize the likelihood of any struck and lost whales, the Tribe will take measures which are designed to provide the most humane hunt practicable consistent with the goal of also providing opportunity for Tribal members to engage in a traditional, culturally appropriate hunt. The MMPA defines "humane" in the context of taking a marine mammal as "that method of taking which involves the least possible degree of pain and suffering practicable to the mammal involved." 16 U.S.C. § 1362(4).

The Tribe proposes to use a toggle-pointed harpoon with line and floats attached to originally secure the whale, followed by shot(s) fired at the central nervous system (CNS) from a high caliber firearm to quickly and efficiently dispatch the whale (Ingling 1997). Any of the .50BMG firearm/ammunition combinations are considered more than adequate to humanely dispatch a gray whale (Ingling 1997). The .50BMG caliber firearm is capable of shooting an Arizona Ammunition solid 570 grain bullet at 3,200 feet/second and generating 13,000 foot-pounds of energy (Ingling 1999). This firearm/cartridge combination can penetrate 240 inches of water, and after using a correction factor, can penetrate the equivalent of 133 inches of flesh. The largest width of a gray whale reported in Perryman and Lynn (2002) was less than 2.8 m (or 110 inches), in which case the .50BMG could create a wound channel completely through the width of the largest gray whale. The flesh covering the portion of the skull housing the brain is under 10 inches thick and the flesh covering the portion of the upper spinal cord is about 18 inches thick on a thirty foot gray whale (Ingling 1997). Considering the overwhelming firepower of a .50BMG caliber firearm, and the size of gray whales, this method is more than adequate to humanely dispatch a gray whale. The gray whale harvested by the Makah Tribe in 1999 expired 8 minutes after the initial harpoon strike (NMFS 2001).

2. Non-Lethal Takes.

In addition to lethal takes of gray whales, the Tribe's waiver request will result in "harassment" of gray whales as defined by the MMPA. The MMPA defines "harassment" to mean any act of pursuit, torment, or annoyance which— (i) has the potential to injure a marine mammal or marine mammal stock in the wild (referred to as Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavorial patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (referred to as Level B harassment). 16 U.S.C. § 1362(18).

Whales that are not killed in the hunt may be subject to "harassment" as a result of approaches and unsuccessful harpooning attempts that do not penetrate the whale's body and hence do not meet the definition of a "strike." Based on experience with whale hunts in 1999 and 2000, the Tribe estimates that there could be approximately 10 approaches and 4 unsuccessful harpoon attempts for every whale struck.

Approaches would be classified as Level B harassment and would be unlikely to result in any increased level of human-caused mortality to individual whales. Gray whales feed, migrate, breed, and calve close to shore, and therefore they encounter humans on vessels throughout their range. There is a major tourism industry that provides opportunities to watch gray whales on the winter breeding grounds in Mexico. Commercial and private whale watching occurs during the migration along the west coast of the United States and Canada. Gray whales encounter commercial fishing vessels in Bristol Bay, and small craft used by Chukotka natives and Alaska natives in the Arctic. Off the coast of Los Angeles, California during the whalewatching season, Rugh et al. (1999) reported that there can be eight to 12 boats following a single whale. The number of approaches incident to Makah whaling will be minor in comparison to these existing sources of harassment. Assuming an average pod size of approximately two animals during the migration period in the Pacific Northwest (Green et al. 1995), the number of whales subject to Level B harassment in a calendar year will not exceed 140.

Unsuccessful harpoon attempts would probably be classified as Level A harassment. However, because the harpoon would not penetrate the body of the whale on the attempt, unsuccessful harpoon attempts would not result in any increase in human-caused mortality. NOAA (2001) concluded, based on their experience with biopsy darting research, that instances where a harpoon did not penetrate the whale would not likely have a significant adverse effect on whale behavior. Clapham and Mattila (1993) assessed behavior of humpback whales (*Megaptera novaeangliae*) in relation to both successful and unsuccessful biopsy attempts. Of the 427 missed biopsy attempts, 87.8% of the time the whales showed no reaction. Missed harpoon strikes would be analogous to missed biopsy attempts, where a projectile lands in the water nearby a whale, but does not cause contact. Clapham and Mattila (1993) reported that of the successfully biopsied whales (n = 565), 66.6% showed no detectable reaction or a low-level reaction (defined as a brief startle or a quick submergence, or both). Because a biopsy indicates a direct hit and therefore removal of a small piece of blubber and skin, for the purposes of assessing adverse effects, a biopsy would cause a more substantial effect than, for instance, a shaft of a harpoon bouncing off a whale. Accordingly, the Tribe does not believe that unsuccessful harpoon attempts (i.e., missed harpoon throws or the situation of a harpoon glancing off the animal) should be accounted for as a source of human-caused mortality for the purposes of applying the PBR methodology. In any event, no more than 28 gray whales will likely be subject to Level A harassment in any calendar year under this request.

D. Factors to be Considered in Prescribing Regulations.

This section provides an analysis of the five factors set out in Section 103(b) of the MMPA, 16 U.S.C. § 1373(b) which the Secretary must consider in prescribing regulations to implement the Tribe's waiver request.

1. Existing and Future Levels of Species and Stocks.

Section 103(b)(1) instructs the Secretary to consider "existing and future levels of marine mammal species and populations stocks." 16 U.S.C. § 1373(b)(1). The critically depleted Western North Pacific stock of gray whales which migrates along the east coast of Asia (Rice and Wolman 1971) will not be affected by this request. As shown above, the Eastern North Pacific stock of gray whales is currently within its OSP range. Even with the level of take proposed in this request, the stock is not likely to diminish below OSP within the foreseeable future. In 2002, the IWC's Scientific Committee estimated that a take of up to 463 whales per year would be sustainable over at least the medium term (~30 years) (IWC 2003). This level of take is substantially higher (by almost 350 percent) than the average annual joint US-Russian quota of 124 whales per year as well as a conservative estimate of all human-caused mortality in a given year. Any regulations promulgated to implement the Tribe's waiver request should provide for reduced strike limits or suspension of the hunt if necessary to prevent the abundance of the Eastern North Pacific stock of gray whales from falling below OSP.

2. Existing International Treaty and Agreement Obligations of the United States.

Section 103(b)(2) directs the Secretary to consider "existing international treaty and agreement obligations of the United States." 16 U.S.C. § 1373(b). The Tribe's request is consistent with current IWC regulations which provide for an aboriginal subsistence quota of 620 gray whales between 2003 and 2007, with a maximum take of 140 gray whales in any one year. By bilateral agreement between the United States and the Russian Federation, up to 20 gray whales may be taken from this quota by the Makah Tribe over the five year period, with a maximum of five whales in any one year. The Tribe's request is also consistent with the IWC's prohibition against the taking of calves and whales accompanied by calves. The number of takes and strikes allowed under this request, as well as the time and manner of harvest, may be subject to reduction if necessary to meet the international treaty obligations of the United States under the International Convention for the Regulation of Whaling (ICRW).

3. The Marine Ecosystem and Related Environmental Considerations.

Section 103(b)(3) requires the Secretary to consider "the marine ecosystem and related environmental considerations." 16 U.S.C. § 1373(b)(3). As discussed above, the Tribe's request is designed to maintain the Eastern North Pacific stock of gray whales at or above an OSP level and to prevent any depletion of the abundance of gray whales along the Pacific coast south of Alaska and within the ORSVI survey area. These measures will ensure that Eastern North Pacific gray whales remain a functioning part of the ecosystem on multiple spatial scales: throughout the migration corridor; the Pacific coast south of Alaska; as well as the local region surrounding the Makah U&A.

In the past, concerns have been raised about the impact of the hunt on seabirds and the safety of the high-powered rifle. The Tribe believes that these concerns are greatly mitigated by its current request which prohibits hunting from June 1 and November 30 and within the Strait of Juan de Fuca. To address further concerns about the impacts of whaling on nesting seabirds, the Tribe proposes a restriction barring any gray whale from being struck within 200 yards of Tatoosh Island or White Rock during the month of May. The Tribe also intends to implement safety measures in their Tribal regulations which are no less protective of public safety than those provided for in its 2001 gray whale management plan (Makah Tribal Council 2001).[11] Further measures to address impacts to other species and public safety may be developed and implemented based on the outcome of the NEPA process.

4. Conservation, Development, and Utilization of Fishery Resources.

Section 103(b)(4) of the Act instructs the Secretary to consider "the conservation, development, and utilization of fishery resources." 16 U.S.C. § 1373(b)(4). No impacts to fisheries, either positive or negative, are expected to occur as a result of the Tribe's request.

5. Economic and Technological Feasibility of Implementation.

[11] These measures authorized the discharge of firearms when whaling only when the shooter was within 30 feet of the target area of the whale and the shooter's field of view was clear of all persons, vessels, and other objects that could result in injury or loss of human life. The measures also set minimum visibility standards for the hunt (Makah Tribal Council 2001).

Section 103(b)(5) of the Act instructs the Secretary to consider "the economic and technological feasibility of implementation." 16 U.S.C. § 1373(b)(5). The Tribe believes that its request will be entirely feasible to implement. The hunting methods called for in its request are not intended to be intensive, but have proven to be effective within the context of the Tribe's goal of providing opportunities for a traditional ceremonial and subsistence whale hunt.

The request should be quite feasible to implement from a management standpoint. The Tribe's waiver request is no more complex than numerous Treaty fisheries that the Tribe has managed in cooperation with NOAA Fisheries and the Washington Department of Fish and Wildlife over the past three decades. With one exception, the proposed management regime is very similar to that which the Tribe successfully implemented in 1999 and 2000. The one major addition is the photographic monitoring of the harvest to ensure that the ABL for the PCFA is not exceeded in any calendar year. The Tribe will have a qualified marine mammal biologist on staff who will administer these provisions in consultation with NMML biologists. In the event that the Tribe is unable or unwilling to effectively implement and enforce Tribal regulations, these requirements will be subject to direct enforcement by NOAA Fisheries enforcement personnel.

VI. Conclusion.

NOAA should approve the Tribe's request for a waiver and adopt regulations that permit the Tribe to exercise its treaty rights in the manner specified in this application. The proposed waiver is necessary for the United States government to fulfill its legal obligations to the Tribe under the Treaty of Neah Bay, will not disadvantage the Eastern North Pacific stock of gray whales, and will be consistent with the purposes and policies of the MMPA.

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VIII. Appendices

Appendix A:

RENKER, A. M. 2002. Whale hunting and the Makah Tribe: A Needs Statement. Report to Intl. Whal. Comm., IWC/54/AS2.

Appendix B:

Treaty of Neah Bay. 1855.

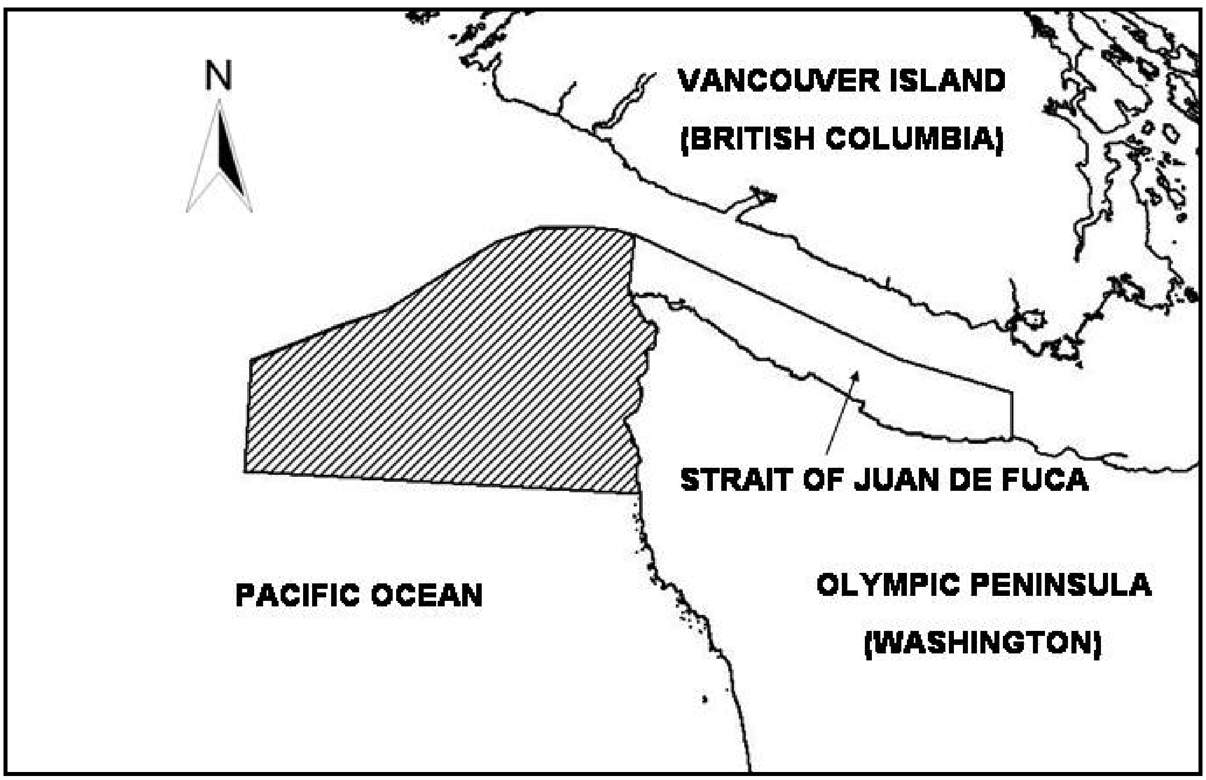

Figure 1. Map of Makah Usual and Accustomed Hunting and Fishing Area (U&A). Eastern North Pacific gray whale harvest by the Makah Tribe would occur in the Pacific Ocean denoted by filled area.

Appendix A

Whale Hunting and the Makah Tribe:
A Needs Statement

Ann M. Renker, Ph.D.
March 2002

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Whale Hunting and the Makah Tribe

I. INTRODUCTION

This document presents information pertinent to the continuation of the Makah subsistence whale hunt, and is presented in two parts: a cultural component and a nutritional component. The Needs Statement demonstrates the following points:

1) Whale hunting for subsistence purposes is an activity Makahs practiced for at least 1,500 years before the present day. Documented use of whale products for subsistence purposes extends another 750 years before this date, since Makahs used drift and stranded whales long before hunting technology developed. Continuation of the restored whale hunt will maintain important subsistence benefits reintroduced to the Makah community in 1999. This benefit increases in importance as the unemployment rate in Washington State increases and as salmon and other Pacific fishing stocks continue to vary in abundance. Increasing variance in international and domestic fishing quotas diminish the reliability of the marine subsistence component of the Makah Tribe, along with the environmental pressures exerted by oil spills, red tides, pollution, and other factors beyond the control of the Tribe. Gray whales are a reliable resource that can offset subsistence pressures from other sources.

2) For 1500 years, whale hunting and its associated components have had important ceremonial and social functions for the Makah community, in addition to the provision of subsistence benefits. The importance of this ceremonial and subsistence practice is demonstrated in the Treaty of Neah Bay, signed in 1855. Makah negotiators insisted that the right to hunt whale be included in the treaty; this right is reserved in Article IV, and is discussed in more depth later in this document.

Elders and anthropologists trace the decline of the social and physical health of the tribe to the elimination of the whale hunt and its associated ceremonial and social rigors. A community survey conducted in 2001 December, demonstrated that an overwhelming majority (93.9%) of the village believes that the resumption of the whale hunt has positively affected the Tribe, and 51.6% specifically cited moral and social changes as the most important benefit. Clearly, the Makah people believe that the restoration of the hunt has contributed to the physical and mental health of the reservation. Continuation of the hunt will maintain this new-found motivation and momentum, and allow the Makah community to redefine and refine ancestral information and values in light of modern times. The revitalization of the hunt has allowed Makahs an additional mechanism to instill the traditional values of the Tribe which help young and old to conquer the vicissitudes of modern life.

3) The Household Whaling Survey (Renker 2002) provides an important tool which provides empirical support for the emotional and psychological benefits mentioned previously. Data indicated that an overwhelming majority of Makah respondents support the Makah whale hunt, and that most reservation households now desire whale products to be a regular part of their diets. For example, 86.5% of survey respondents wanted whale meat in their households on a regular basis, and 72.4% of the survey respondents felt the same way about whale oil. (Survey results are discussed in detail in later sections of this document.) The results of this survey present a good picture of the mainstream opinion of the Makah people.

4) The Makah Tribe has been actively involved in the management and protection of its wealth of resources for millenia. For thousands of years, the Makahs achieved and maintained a functional balance with many land, air, and ocean species, especially the gray and humpback whales. This carefully constructed dynamic was upset during the years of unregulated whale hunting by others on the Pacific Coast. The restored Makah whale hunt has not affected current eastern Pacific gray whale stocks negatively, and is small in comparison to the total aboriginal subsistence harvest. In fact, current figures indicate that the gray whale population continues to maintain numbers that are at historic high levels.

5) The Makah people can now actively demonstrate the continuing existence of their 2,000 year old subsistence culture. The whale had always played an integral part in the subsistence practices of the Makah Tribe, save the brief seventy year period which commenced in the 1920s. While the decimation of the whale herds made it virtually impossible for Makahs to procure the food which traditionally carried the most extraordinary social, cultural, and nutritional benefits, the restored hunt provides modern Makahs with a rich source of traditional foods which are nutritionally superior to many non-indigenous provisions which are available to the community.

The gray whale population now exceeds early historic levels. The Makah subsistence and ceremonial need to take whales should continue to be recognized and respected. Since the Tribe has a conservation record of considerable time depth, a limited subsistence whale hunt will continue to be easily managed. More importantly, another annual quota of five whales will maintain the benefits secured for future generations of Makah people by Treaty negotiators.

The Makah request for five whales is again predicated on the fact that Tribal membership is now composed of the residents of the five traditional Makah villages which were consolidated during the early years of the Reservation. Since Treaty times, the Makah Tribe has always represented itself as a nation which began as five villages. This request honors this tradition, and asks for one whale per village.

In addition, a review of the ethnographic literature finds that the number five, whether an actual figure or an average, appears multiple times in discussions of early historic harvests (Jewitt 1815, Cavanaugh 1983, Huelsbeck 1988). Five whales per year did not create an undue population stress for a healthy gray whale stock in the years prior to 1830, and would not adversely affect the modern, healthy, gray whale population of the eastern Pacific (Environmental Assessment 2001).

METHOD STATEMENT

Interpretation of Makah history, culture, and language is accomplished through the juxtaposition of a variety of sources. By evaluating evidence from Makah archaeological sites (like Ozette),in conjunct with oral histories, linguistic information, ethnographies, and early written records of traders, explorers and agency employees, one generates a cultural profile that simultaneously integrates and cross-references these distinct sources of data.

The primary source of archaeological data substantiating the existence of Makah pre-Treaty whale hunts and offshore fisheries is the Ozette Collection, the largest and most comprehensive collection of pre-contact Makah artifacts in the world. The Ozette village was one of five pre-contact Makah villages which were occupied throughout the year: **di.ya** or Neah Bay; **bi?id?a** or Biheda; **wa?ac'** or Why-atch; **c'u.yas** or Tsoo-yess; and **?use.?i=** or Ozette (Taylor 1974). Unlike the others, Ozette was partially buried by a catastrophic mudslide approximately 400 years ago. A massive archaeological excavation from 1970 - 1981 uncovered 50,000 artifacts that were remarkably well preserved; these artifacts tell the story of the Makah culture as it was prior to contact with non-Indians (Wessen 1982, Huelsbeck 1983).

When interpreting the anthropological literature, a standard procedure relating to the classification of the Makah culture as a member of the Nootkan cultural group was followed. The Makah culture is the only example of a Nootkan culture outside of Canada; all other Nootkan groups reside along the western and southwestern coast of Vancouver Island. Scholars recognize the close relationship between Makah and the other members of the Nootkan cultural category (Curtis 1911, Drucker 1951, Driver 1969, Arima 1990, Renker 1994). It is therefore standard practice to consider sources relating both to the sub-group which is the focus of inquiry (Makah), and nearby closely related sub-groups on Vancouver Island (**nu.ca.nu.=** bands).

For the nutritional component of the Needs Statement, the document utilized the methodology and definitions endorsed by the United Nations University and the International Union of Nutrition Science's Committee on Nutritional Anthropology.

The methodology for the Household Whaling Survey (Renker 2002) is discussed in Appendix 3.

Definitions

Pre-contact refers to the chronological time period prior to 1788. **Historic** refers to the chronological time period from 1788-1933. **Contemporary** refers to the chronological time period from 1934 till today.

A Makah elder is an individual who is enrolled in the Makah Tribe, is over 75 years of age, and is a native speaker of the Makah language.

Westcoast refers to the generalized cultural group of Makah, Nitinaht, and Nootkan peoples. **nu.ca.nu.=** refers only to Nitinaht and Nootkan peoples since these people are closely related subgroups who live on Vancouver Island.

Subsistence refers to the anthropological concept that a particular food product or supplement is directly acquired by the people who will use the item for local consumption and nutritional purposes.

Linguistic and Other Conventions

Elements of the Makah language (morphemes, words and the like) are printed in **bold** type to enhance visibility. Because of the limitations affecting the preparation of this opinion, I use a variation of the Makah Alphabet. A key to the adaptation used in this document is included in Appendix 1.

Indented citations with quotation marks are taken from oral histories. Indented citations without quotation marks are from written sources.

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II. WHALE HUNTING AND THE MAKAH TRIBE: THE CULTURAL COMPONENT

Cultural Abstract

Anthropologically, the Makah culture is classified within the Nootkan sub-division of Northwest Coast cultures. The Makah people speak a language, **q*i.q*i.diccaq**, which is classified as a member of the Wakashan language family. The Makah Tribe is the only representative of the Nootkan cultural classification and the Wakashan language family in the United States (Renker and Gunther 1990; Renker 1994).

Classic descriptions are exemplified in Swan (1870), Curtis (1911), Waterman (1920), and Densmore (1939); some of the more recent publications include Renker (1994) and Renker and Gunther (1990), which span pre-contact through contemporary times, as well as Parker-Pascua (1991), which concentrates on Makah pre-contact life. Like all cultures termed Northwest Coast cultures by anthropologists, the classification is based upon factors first identified in these cultures as each existed in early historic times. Makah culture exhibits a number of characteristic Northwest Coast traits and trait complexes, including:

1. Emphasis on achieved wealth as measured in property and hereditary rights;

2. Complex patterns of social stratification;

3. A highly developed painting and wood carving style;

4. A material culture based on the abundance of the wood resource in the area, especially when related to the absence of other technologies, such as ceramics; and,

5. A subsistence pattern based on the utilization of available marine, riverine, subtidal and intertidal resources, as well as a predictable supply of anadromous fish.

The factors which further classify the Makah culture within the Nootkan sub-division provide a more detailed list of items which distinguish the Makah culture from other American Northwest Coast cultures. These factors include: a)the integration of rank and kinship as the basis for social interaction (Drucker 1951); b) the integration of land and sea spirits in a ceremonial complex which featured both inclusive and exclusive secret societies and events (Curtis 1911, Sapir 1939, Sapir and Swadesh 1955); c) the development of a highly regulated system of ceremonial and economic privileges, including the ownership of, and control over, tangible and intangible properties such as whaling grounds, fishing grounds, and other sections of ocean and river property (Curtis 1911, Densmore 1939, Drucker 1951); and d) the development of ocean-going technologies like fixed referent navigation and the construction of sea-worthy canoes (Drucker 1951, Renker and Pascua 1989).

These last technologies are prominent components in the most dramatic pursuit of the Makah Tribe: whale hunting. Several Pacific coastal Tribes utilized dead whales which happened to drift onto the shore, or cultivated ritualists who actively used sympathetic magic to entice these drift animals. In contrast, the Makahs and some of their Vancouver Island relatives were famous for their active and aggressive hunt of these large sea mammals (Swan 1870, Waterman 1920, Densmore 1939).

The Whaling Culture of the Makah Tribe

The relationship between Makah people and whales is one of great antiquity. Archaeological data from a recent excavation at the Makah village of Wa-atch indicate that whale bones were present some 3,850+ 75 years b.p. (before present) (Wessen 1994). Food use of drift and stranded whale predated hunting technology. Better known data from the Ozette site demonstrate some 1,500 years of continuous whale use. This practice continued through the period of contact with non-Indians, and persisted into this century. Recorded history provides a variety of dates for the last Makah whale hunt prior to 1999; it probably happened during the latter half of the 1920s (Laut 1928).

Archaeological and ethnohistorical data demonstrate that Makahs hunted a variety of species of whale which traveled through their territory, including the gray (Eschrichtius robustus), humpback (Megaptera novaeangliae), finback (Balaenoptera physalus), and right whales (Eubalaena glacialis). Huelsbeck (1988a:5) discusses the traits which make both gray whales and humpbacks attractive prey. In addition to swimming slowly and near the shore, both types of whales could appear during the summer. Humpbacks have also been known to migrate along the coast, but not to the extent that gray whales do. Non-Indian whale hunters characterize the gray as the more aggressive species of the two during a hunt (Hagelund 1987).

There is no doubt that Makah people hunted whale in pre-contact times, and that the hunt was an important subsistence activity. The Ozette site yielded whale hunting gear and over 3400 whale bones, including whale bones with embedded harpoon shell blades (Huelsbeck 1988a:1).

The archaeological record is supported by ethnographic sources like the Jewitt Narrative, one of the most interesting and important first person accounts generated during the European exploration of the Pacific Northwest Coast. John Jewitt was one of the surviving crew members of the ship Boston, which was ravaged and sunk by the **nu.ca.nu**.= Chief, Maquinna, in Nootka Sound in 1803. Jewitt remained in Maquinna's service as a slave until his rescue in 1805, and recorded his experiences and observations in a diary first published in 1815.

In spite of his ethnocentrism and lack of knowledge of **nu.ca.nu.=** culture, Jewitt's observations remain a key document in the early historical record of the area. Jewitt describes the enormous amount of time Maquinna and his crew invested in the pursuit of offshore whales in 1804 and 1805. During these years, Maquinna had only one successful hunt.

Cavanaugh (1983) indicates that Maquinna's lack of whale hunting success during the 1804 and 1805 seasons at Nootka Sound was not indicative of the fate of other hunters. While Maquinna secured one whale during Jewitt's captivity, hunters procured an additional four whales. Simple addition indicates that the people of Nootka Sound had the food and product resource of five hunted whales at their disposal.

According to Huelsbeck, calculations produce a scenario based on abundance, rather than paucity. Using a very conservative estimate, the five whales caught at Nootka Sound "would have provided between 16.25 and 37.5 metric tons of blubber, and could have provided a similar amount of meat, depending on whether or not the California gray or the larger humpback whale was taken" (Huelsbeck 1988b:3). This huge quantity of meat and blubber could have provided between 32.5 and 150 kg. of edible whale product per person for a village with a population of 500 individuals (Huelsbeck 1988b:4).

Certainly the number of whales taken by all Makah crews varied from year to year. A minimum of 67 whales were "represented by the bones recovered from the late prehistoric level" at Ozette (Huelsbeck 1988a:7), constituting a huge quantity of food products and raw material. Based on historic documents, Huelsbeck estimates that whalers of the Yuquot band, a **nu.ca.nu.=** group, "would have averaged 5 whales per year" (1988:157). Densmore reports a much higher success rate for historic Makah whale hunters. "In old times the average catch for a whaler was one or two whales a year, but a man often caught four and occasionally five in a season" (1939:63). Wilcox (1895:20) provides a more conservative appraisal of the Makah whale hunt for the years 1889-1892. His figures indicate that the Makah Tribe averaged 5.5 whales per year (as cited in Huelsbeck 1988:152) at a time when the cetacean population had already been severely impacted by other, non-Makah whaling interests.

Makah whale hunting capitalized on the annual northerly migration of the gray whale, and the availability of the humpback in their waters. Archeological data corroborate Makah oral history in this regard. In the Ozette Collection, 50.51% of the whale bones identifiable by species were that of the gray, while another 46.51% came from the humpback (Huelsbeck 1988a:4). The remainder of the sample contained finback, right, sperm and killer whales. Huelsbeck interprets the archaeological and ethnohistorical data to indicate that the finback and right whales were hunted from time to time, while the sperm and killer whales "probably represent drift whales" (1988a:6), although some Makah families have oral traditions which involve hunting these species.

The impressive gray whale migration approximately occurs from March to May, and provided a predictable resource that could be harvested by eight man whaling crews which set forth in large cedar canoes. In one hunting strategy, lookouts stationed at strategic points could see a whale and alert the proper individuals, providing enough opportunity for canoes at the ready to launch and chase the whales. (This type of whale hunt, termed an offshore hunt in Hagelund (1987) and Webb (1988), would be adopted by the non-Indian whaling interests in the area centuries later.)

Whale hunts were not restricted to this northerly migration, however. Densmore (1939:49) reports that Makahs distinguished spring whale meat from winter whale meat:

> The whales that "run in the spring" and were known as "spring whales" were said to have red meat because they ate clams and other shellfish they scooped off the rocks. The "winter whale" was considered the best and had a layer of white fat on the outside and red meat underneath.

Whatever the season, the whale hunt tested the training and stamina of the entire crew. A lucky crew might take a whale within a few miles of shore, while some hunts found Makah crews towed thirty or more miles out to sea by an injured whale. Whale hunters told Densmore that

> A wounded whale usually towed the canoe by means of the harpoon rope, held by the men, its speed depending on the severity of its wound. Sometimes the whale went so fast that the end of the canoe went down in the waves. This towing of the canoe might continue for three or four days, the whalers waiting until the whale became sufficiently weary to be dispatched (1939:52).

These great sea mammal hunts (Swan 1870, Waterman 1920), as well as interceptive and deep water fisheries, would not have been possible without a highly developed system of fixed referent navigation, and a keen understanding of the prevailing winds and weather patterns in Makah marine territory. (One appreciates Makah navigational skills more thoroughly when one considers that Captain Cook failed to "discover" the opening of the Strait of Juan de Fuca because of the thick fog.)

An example of the Makah fixed referent system was provided by a Makah elder who has been fishing since the 1920s.

> "There's a ridge on Vancouver Island, I think the main peak there is behind Carmanah Light, and that's Carmanah mountain. That's the highest one, and there's a ridge behind that as you venture to the west, one peak will show up behind that as you venture to the west, one peak will show up behind that high peak on the ridge. The first one is **c'akwaqabas**, the second one is **?a7qabas**, and then you have a low kind of ridge, it drops down for quite a ways, and then another peak shows up, and that's in...oh...mostly used for sealing grounds, called The Spit. Now I have electronic navigational equipment, and I look upon those landmarks to determine just where we actually were when we were one peak out, two peaks out, or seven peaks out."

When navigating out of sight of land, Makah seafarers relied on the prevailing winds and currents, as well as the shape of the waves and behavior of seabirds. For example, prevailing winds in the early morning are mostly easterly, and their afternoon counterparts are mostly westerly. Makah canoes ventured out of the sight of land knowing that attention to wind, wave, and fauna would return the vessels to land.

Makah ocean voyagers also understood that these navigational techniques could lead them directly to prime off-shore fishing and whaling areas. In the words of an experienced Makah fisherman,

> "Prevailing currents, can predict them. They run on schedule. They tell direction and duration...Once off shore, the current changes every six hours: north to south, then south to west, then west to north, then north to east. A massive current moves all the time. Currents are predictable and steady...able to predict spawning areas."

Great cedar canoes provided the means for Makah seafarers to travel these great distances offshore. Fisherman, sealers, and whale hunters each used a different type of canoe which varied in size. The whaling canoe was approximately 36 feet long (Pascua 1991) and five or more feet wide (Arima 1983:35). Carvers fashioned these vessels from a single cedar log, providing canoes that "deserve the very highest place for staunch seaworthiness, coupled with great manageableness (sic) and speed" (Waterman 1920:9).

A whaling crew consisted of a chief, or the whaler, and seven men. The whaler owned the canoe and the whaling equipment, and acted as the sole harpooner in the whaling canoe. He also owned important ceremonial privileges acquired through his hereditary status and his ability to interact with the natural and the supernatural to assure a successful hunt.

Other crew members included a steersman, a man responsible for managing the lines and buoys, numerous paddlers, and a man who had a unique responsibility once the hunt was over and the whale was dead. This crew member, a diver, fastened the whale's mouth shut with a length of rope. In addition to sealing in gases which kept the whale afloat, fastening the mouth prevented water from filling the carcass and sinking it (Curtis 1911; Waterman 1920; Pascua 1991).

Whaling was restricted to the men who could physically and mentally withstand the rigors of intensive ritualized training, possessed the hereditary access to the position and its ritualized knowledge, and/or a underwent a supernatural encounter which engendered the gift of whaling ability (Waterman 1920:38-40, Gunther 1942, Drucker 1951:169-170).

All crew members underwent rigorous ceremonial and spiritual preparations prior to beginning a hunt; the success of the hunt depended as much on the observance of ritual as the strength and talent of the hunters (Sapir 1939:114).

> From the white point of view, the matter of greatest concern would be the arrangement of the tackle within the boat, and the methods of approaching and striking the quarry. From the Indian standpoint, however, the really important matter is the proper observance before and during the hunt of the various ceremonial performances for procuring help from the spirits. (Waterman 1920:38)

Curtis (1911) provides the most detailed accounts of rituals whalers used to prepare themselves for the hunt.

> Prayers and numerous songs form a part of every whaler's ritual. The secrets of the profession are handed down from father to son. As soon as the boy is old enough to comprehend such matters and to remember his father's words, he is permitted to accompany the whaling crew on short expeditions. Now also begins his instruction concerning the most propitious spots for ceremonial bathing-places in lakes and rivers considered the most dangerous. At the age of twelve he is taken at night and shown how to bathe and to rub his body with hemlock twigs so as to remove the human taint and render the body acceptable to the whale spirit which is being supplicated. Thereafter he bathes alone at intervals, while

> his instruction in prayers and songs continues until the father deems it proper to retire in the young man's favor (16).

These ceremonial rigors extended to the wives and relatives of the whaling crew, the chief's wife in particular. "Therefore, the whaler and his wife observe a long and exacting course of purification, which includes sexual continence and morning and evening baths at frequent intervals from October until the end of the whaling season...about the end of June" (Curtis 1911:16). This woman was expected to observe a strict set of behaviors while the crew was hunting on the ocean, or else cause havoc with the crew at sea. For example, the whaler's wife was required to lie still and utterly motionless the entire time the crew was hunting on the ocean. Lack of attention to this and other proscribed behaviors could also result in the capture of a whale that was not fat or large enough, or cause the harpooned whale to run out to sea instead of in toward the shore (Gunther 1942).

Physical equipment was also important to the pursuit of the whale. Makah whaling equipment consisted of, but was not limited to: harpoons, sealskin floats, fathoms of line made from whale sinew, fathoms of line made from cedar, and a variety of knives (Curtis 1911:16). Detailed discussions of the equipment and its use are found in Swan (1870) and Waterman (1920). Makah archaeological excavations, most notably Ozette, produced assemblages of this equipment, some of which are now on display at the Makah Tribe's museum and cultural center.

There is an amazing continuity which surrounds Makah whale hunting gear. Pre-contact whale hunting equipment found at Ozette is essentially equivalent to whale hunting gear used by Makahs during the middle and late historic period. This amazing continuity does not exclude innovation. Makah whale hunters appreciated innovation and the opportunity to improve the hunt. By the turn of this century, Wilson Parker, the Makah Whaler of Curtis' photo fame, used a metal Lewis Toggle Hook Harpoon Head on the end of his traditional yew wood harpoon, for example. Another innovation helped to cut the tedious and tiring job of endless paddling: whaling canoes accepted tows from steamers to and from the whaling grounds when the technology became available.

The Makahs hunted the variety of whales which swam in their traditional ocean areas, but favored the predictable gray whale. Descriptions of the hunt itself are available in Swan (1870), Curtis (1911), Waterman (1920), Drucker (1951), Arima (1983) and Pascua (1991).

> It would take a long time to get close to the whale while it was on the surface. Eventually, the crew brought the canoe alongside approaching on the left side and from the rear where the whale could not

> see them. The right time to harpoon was when the whale was just submerging, with its flukes well under and swung towards the canoe so that the animal would swing away in reaction and not smash the canoe (Chief Jones, personal communication). The steersman watched to see the flukes were in the right position and gave the signal to the harpooner who immediately drove the harpoon in behind the fore flipper. At once the canoe was swung sharply to the left away from the whale, and the first float was thrown out by the first right-handed paddler behind the harpooner who quickly crouched in the bow to avoid the line paying out. The next paddler back held his paddle under the line to have it run out smoothly from the space before him. The dangerous moments lasted until all the line and floats were all out because someone could get caught in a loop or the canoe could be capsized or smashed in the first violent struggles of the whale before it sounded. Any disaster that happened was thought due to the incorrect observation of tabus or performance of rituals (Arima 1983:41).

Once the first harpoon had been driven into the whale and the first set of floats were secured, a long lance was used to "attack the whale, making it bleed profusely" (Densmore 1939:50). Makah whalers told Densmore that the process of killing a whale, from first harpoon to final dispatch, could take "three to four days" (1939:52).

The successful whaler and his crew now had to tow the enormous animal and navigate their precious whale back to land, a process which could take two days (Densmore 1939:52). Unfortunately, the long delay in landing the animal could allow putrefaction to begin, thus causing the loss of the meat. The blubber would not be adversely affected by this long journey back to the beach.

Ideally, the whaler wanted to land his prize on his own beach at his own village. Using the tide to help him, the whaler beached the carcass at high tide, "to get the bones of all his whales in one spot" (Arima 1983:43). If a whaler had to beach his catch on another whaler's beach, payments had to be made; these often consisted of portions of the whale.

As the whale was staked and readied to be butchered, the community gathered for this event. Strict protocol governed the butchering process, specifying which portions of the whale were to be cut in sequence. Some regulations identified the pieces of the whale which had to be decorated and ceremonially treated. Others specified which portions were distributed to crew members and other village inhabitants. "Then pieces were given to the rest of the Tribe in order of rank, a procedure which was always carefully observed" (Arima 1983: 43). In effect, the distribution of the whale reinforced the infrastructure of Makah society each time the process occurred.

The highly stratified nature of the Makah social system was a mirror of the status and structure involved in the entire process of the whale hunt. From ceremonial preparation, to the hunt itself, to the ultimate acts of butchering and distribution, Makah whaling actualized the social organization of Makah society. The man who acted as the harpooner for a crew was the chief, or headman, of a particular social group, usually the residents of a single longhouse. He owned the longhouse, the whaling canoe and the equipment. This man also retained the largest burden of ceremonial preparation. These two factors, a large degree of physical wealth and a close relationship with the supernatural, translated into power for the whalers in everyday life.

Whalers, or headmen, were ranked at the top of the pyramid of social standing which existed within a single longhouse. Each resident was affiliated with the headman in some way; this affiliation became the basis for ranking each individual within a residence group. Whaling generated a base from which these relationships were constantly renewed and reinforced. A successful headman could offer prestige, protection and resources to the kin and non-kin residents of his longhouse. A headman who experienced consistent failure, ostensibley because of poor preparation and ineffective supernatural connections, could lose status within his household, and lose non-kin residents as a result. The loss of these residents often translated into a loss of physical wealth and social prestige for a headman.

The anthropological literature tends to concentrate on the role of high-status men in the whale hunt. Makah oral history and articles like Gunther (1942) demonstrate that women played an important social, ceremonial and practical role in the whale hunt complex. Men, for example, were not the only ones affected by relationship between the whale hunt and social status. The women who married whalers dominated the top of the female analog to the male status pyramid. These women, like their male counterparts, found their lives governed by the concept of primogeniture. While whalers tended to be the oldest son of the oldest son of a whaler, the whaler's wife tended to be the oldest daughter of an oldest daughter of a whale hunter. Matches between the oldest son of one whaler and the oldest daughter of another were the ultimate social goal of whaling families. These alliances united two powerful, wealthy families, and insured that consolidated social, ceremonial, and political power would be transmitted to another privileged generation; this procedure is common to historical and contemporary royal families.

Oral history and anthropological documents attest to the fact that the Makah whale hunt generated a series of criteria which governed social processes like status assignations, marriage preferences, and ceremonial displays. The community-at-large played an important role in the success of the whale hunt, even though its role is far less visible in the written record. While anthropologists were most interested in the ceremonial, social and work activities of the privileged classes, it was the support labor that processed, preserved, and prepared the whale products, as well as conducted the trade activities. People of extraordinary talent in any of these activities were recognized and recompensed by those of higher social status. These people of talent, when combined with a high status chief, resulted in a longhouse with a reputation for great things.

Therefore, whale hunting provided more than a means of organizing social groups within a longhouse; the whale hunt also provided a mechanism by which longhouses in a single village related to each other. Accumulated ceremonial and economic wealth often provided a means to rank the whalers, or headman, vis a vis each other. This ranked order precipitated to the residents of each longhouse. In effect, whaling generated a social dynamic which ranked all Makah individuals within a residence group, a longhouse. The practice also generated a social dynamic which ranked all Makah individuals in relation to the inhabitants of all other longhouses. Whaling was the warp and the woof of Makah society.

In addition to providing the whalers with ceremonial privileges, and Makah society with a governing principle and a means to subsistence security, the Makah populace received other benefits from whale hunts. These benefits included, but were not limited to the following:

1. Whale products such as blubber and oil proved an important source of trade goods. The Makahs served as the middlemen in a huge trade network. Because of their geographical advantage, Makahs operated a critical position in a network which functioned north and south along the Pacific Coast, as well as from the Pacific Coast to the Puget Sound (Swan 1870, Renker and Gunther 1990, Renker 1994). Whale products insured that the Makah people enjoyed a high standard of living with diversified interests (Huelsbeck 1988).

2. Whale products provided a substantial food resource for the Makah people. Early archaeological studies indicate that as much as 84.6% of the Makah pre-contact diet could have been composed of whale meat, oil and other food products (Huelsbeck 1983:43). Recent collaborative efforts between Dr. Huelsbeck and marine biologists have resulted in an adjustment to this early statistic. The projected size of the gray whales found at the Ozette site was too conservative; the mammals could easily have provided 100% of the food for the Makah Tribe (Huelsbeck 1995: personal communication). Clearly, whale products fulfilled important subsistence functions. In addition to nutrition, 25% of bone tools found at Ozette were made from whale bone.

3. The skills needed to hunt whales on the open ocean easily

transferred to Makah offshore activities, including deep water and interceptive fisheries and seal hunting. These pursuits provided additional sources of trade items and food.

4. Ceremonies needed to prepare whalers and their respective families for the hunt provided the Makah culture with a social framework that contributed to governmental, social, and spiritual stability.

The four cultural points articulated here have corollaries in the modern world. In relation to trade, the Makah Tribe signed an agreement with the United States Government which restricted the sale of whale products which were generated from whales harvested under the IWC quota. This agreement does not restrict Makahs from utilizing the subsistence-based redistribution networks that already existed within the reservation. Data clearly indicate the presence of localized networks that aid in the redistribution of whale products, particularly to family members who were not adept at processing and preparing whale themselves (Renker 1988, Aradanas 2001, Renker 2002).

Whale products have become a significant food resource for modern Makahs, in spite of the fact that only one whale has so far been successfully hunted during the first IWC quota period. In fact, a drift whale which washed ashore in an isolated part of Makah territory, was butchered and distributed to over 100 Makah households during the summer of 2001. This event is significant because the increasing Makah demand for whale products motivated more Makahs to utilize the drift whale, and return the meat, blubber, bone, and other parts to Neah Bay by boat. Since the whale was located on a remote beach with no road access, a small fleet of boats ferried whale parts from the beach to the boats, then back to Makah households.

Makahs are utilizing whale food products such as meat, blubber, and blubber rendered into oil, as well as other whale parts not as well known to non-Makahs: eyes, brain, heart, cheeks (the Makah reference to the jaw muscles and the fleshy area under the eyes), and the like. Modern Makahs have quickly rediscovered their ancestral appetite for whale products: 72.4% of surveyed households would like whale oil on a regular basis, 86.5% would like whale meat on a regular basis, and 55.8% would like blubber on a regular basis. Numerous survey respondents indicate a preference for sea mammal products for both traditional and health reasons (Renker 2002).

The significance of the whale as a food resource is also apparent when examining the variety of preparation methods in use on the Makah reservation. One might expect a paucity of recipes and techniques for preparing whale meat and blubber, given a seventy year gap in actuality. Instead, respondents provide the following data. Of the 61.3% of the respondents who received whale meat from the 1999 whale, 41.5% made jerky, 43.9% ate roasts, 41.5% cooked stew, 35.4% grilled steaks, and 34.1% smoked meat. 19.5% of respondents also indicated a preparation methods other than those offered by the survey. These innovative methods included stir frying, kippering, deep frying, barbecuing, and boiling. Two respondents made whale burgers, and one created whale sausage. Of the remaining respondents who did not receive whale meat for their personal consumption, 84.7% indicated that they would have liked meat from the 1999 whale.

Of the 75.3% of respondents who prepared blubber, 22.4% smoked it, 37.9% rendered the blubber into oil, 6.9% pickled it, 48.3% boiled it, and 65.5% ate the blubber raw. An additional 3.4% of respondents used the blubber for cosmetic purposes. Several interview respondents did indicate that rendering the blubber from the 1999 whale posed problems because of a low concentration of fat in the animal (Renker 2002).

Whale oil is a particularly important commodity for the Makah people, and its precious nature increases its value. The rich oil is used the way many people use olive oil. In the Makah example, many people flavor dried or plain food, such as fish, fish eggs, potatoes, or bread, by dipping these foods into the whale oil. This use is a traditional one, and is mentioned in the earliest ethnographies, such as Swan (1869) and Densmore (1939). In addition, whale oil may be used in particular ceremonial and ritual activities. In one example, when thrown onto a roaring fire in the middle of a longhouse, the whale oil causes the fire to blaze up in a most extraordinary manner; this effect looks the same to modern Makahs as it did to their ancestors, increasing the spiritual connection between past and present.

The Household Whaling Survey attests to the significance of the whale as a food resource because of the large number of respondents who want additional information about processing and preparation techniques for whale products. Of 163 respondents, 70.6% wanted more information about preparing whale meat, 52.1% wanted to know more about butchering whale, 60.1% wanted information about rendering oil, and 59.5% wanted to know about smoking meat.

Modern Makahs also have an interest in whale bone as a raw material. 75.5% of Makah households report that they would like to have access to whale bone on a regular basis, and some people were disappointed that the bones of the 1999 whale were not made available to the community for private use. Instead, the Makah Tribal Council made an arrangement with the Neah Bay High School which provided vocational opportunities for high school students. The entire skeleton of the 1999 whale was given to the high school so that students would learn to clean and prepare the bones for reassembly and eventual display at the Makah Cultural and Research Center. The National Marine Fisheries Service, The Burke Museum, and the Denver Museum of Natural History are all additional participants in this ongoing project (Monette: personal communication: 2002). To date, some 40 Makah high school students have learned valuable vocational skills through the skeletal assembly project. Faunal assembly skills are in demand in museums and laboratories throughout the United States.

Most importantly, contemporary Makahs insist on the ceremonial rigor and discipline that was so important to their ancestors. 38.7% of respondents in the Household Whaling Survey report that they have actively participated in whaling ceremonial practices since the 1999 whale was harvested, and that 21.6% of their household members are also active ceremonial participants. These figures are meaningful, given the seventy year hiatus in whale hunting, as well as the secretive atmosphere which surrounds these activities. The serious attention given to the ceremonial preparation requirements also acts as an indicator of the positive impact that the whale hunt has had on the social and behavioral aspects of Makah life (Renker 2002).

For example, early ethnographies (Swan 1869, Densmore 1939) as well as recent depictions of pre-contact life (Parker-Pascua 1991) mention the practice followed by whalers' wives of "laying still" with their backs to the ocean while their husbands were hunting whale. By following this practice, wives would spiritually connect with the whale in the ocean, causing it to "be still" on the water, and to swim toward, rather than away, from shore. In the successful 1999 hunt, wives, partners, and mothers of the crew followed this ceremonial practice, and two of these women were brought onto Front Beach in the ritual manner when the whale was brought ashore. Men do practice ceremonial preparations like bathing, but as in pre-contact and historic times, their exact activities are kept highly secret.

A Diachronic Account of Makah Whaling

The Ozette archaeological literature, especially the work of Huelsbeck (1983, 1988, 1988a, 1988b), attests to the considerable time depth and continuity of the Makah whale hunt. Prior to contact with non-Indians, the Makahs and their **nu.ca.nu.**= relatives hunted whale successfully for at least 1200 years without destroying the resource. Ceremonial, social and cultural proscriptions established a functional balance between the Makahs and the whale populations which swam in or through Makah waters.

Once non-Indian traders and explorers entered the waters of the Pacific Northwest, Makah whale hunters felt the effects of an increasing demand for whale products. In response, Makahs continued to ply their well established trade in whale oil and whale products with the visitors.

The regularity and size of the gray whale migration attracted whalers from the United States and Europe. Like the Makahs, other non-Indian whale hunters appreciated the opportunity to practice offshore whaling in the area, as opposed to the more expensive, more protracted, multi-year ocean voyages. "As the market for whale oil and dogfish oil increased in the 1840s and 1850s, the Makah brought oil for sale...Oil purchased from the Indians was a major export of the Hudson's Bay Company" (Lane

1955:17). By 1852, Makahs were trading or selling some 20,000 gallons of whale and fish oil (Lane 1955:18); this figure would rise to 30,000 gallons per annum within 20 years (Gibbs 1877:175).

In 1854, Capt. Charles M. Scammon discovered the breeding grounds of the gray whale in the lagoons of Baja California and Mexico (Hagelund 1987:42-43); this discovery now provided the two terminal points for the gray whale trek, and helped to increase the exploitation of the gray whale on the American Pacific coast.

As time passed and contact with non-Indians increased, other entities intruded into Makah life, and by extension, into the whale hunting complex. Governor Stevens, assigned by the United States' government to negotiate a Treaty with the Makah in 1855, knew of the commercial value of Makah whale hunting talents when the Treaty of Neah Bay was signed. Indeed, numerous Makahs made speeches during the Treaty negotiations asking that the right to whale be reserved to them when the Treaty was signed. These Makah negotiators, and Gov. Stevens, agreed that Article IV. of the Treaty of Neah Bay would specifically list whaling, along with sealing and taking fish, as a right guaranteed to the Makah Tribe. Article IV. of the Treaty of Neah Bay makes Makahs unique among all United States' native tribes: Makahs are the only tribe whose right to hunt whales is recognized in a treaty with the government of the United States.

While the Treaty of Neah Bay preserved the Makah right to hunt whales and seals, and to fish in usual and accustomed grounds, other federal interactions with the Makah did not seem to support this language in actuality. Assistance sent to the Makahs contained agricultural tools, rather than items which supported any of the active components of the Makahs' maritime lifestyle. Instead of tools and materials which would help to procure, process or preserve whale, seal or fish products, Makahs received pitchforks, scythes, hoes, and sickles. "James Swan reported in 1862 that the Makahs had converted the tines of pitchforks into fishhooks, scythes into blubber knives, and sickles into arrowheads" (Marr 1987:29). The Makah reaction to the agricultural materials is perfectly understandable given their splendid maritime talents and the fact that Makah land was obviously unsuited to cultivation (Whitner 1977, Renker and Gunther 1990).

Rather, the motives of the United States are suspect. While soil studies may have been unsophisticated in the mid-nineteenth century in the Pacific Northwest, it took little effort to realize that the soil, vegetation, and topography of the coastal area was unlike the rich agricultural belts in other parts of the country, such as the Plains and the Northeast. Indeed, the land on the Makah reservation was clearly different from that of the Washington territory east of the Cascade Mountains.

This bizarre situation developed because of prevailing ideas regarding federal Indian policy; it had been developed with a very different perspective. The United States government did not want to encourage self-sufficiency, because self-sufficiency often encouraged hunters and gatherers to travel beyond the confines of the established reservations, and to maintain cultural practices considered savage and barbarous. The best way to force a sedentary existence on a group of hunters and gatherers was to make the group dependent upon agriculture, which required a fixed resource base. The singular nature of this policy was also inappropriate for the Makahs, who already had a fixed, plentiful marine resource base and no land suitable for agriculture.

A philosophical mandate accompanied this strategy. "One of the convictions of those associated with the administration of Indian affairs, both officially and informally, was that farming was associated with civilization" (Whitner 1977:21). In the Makah case, Indian policy was designed "to change the Makahs from self-sufficient food gatherers to farmers, dependent on the white people for tools and instruction" (Marr 1987:29). Indian policy was also designed to assimilate Makah people through an educational system that ignored Makah priorities and prohibited the use of the language, in addition to eradicating customs considered heathen, savage, and dangerous (Colson 1953, Gillis 1974, Whitner 1977, Renker and Gunther 1990).

Whitner (1977) reports that Indian Agency personnel were somewhat daunted by the task of civilizing the Makahs, and cites Henry A Webster, the first resident Indian agent, as writing in 1866, "The Makah are probably nearer the normal state of savage wilderness than any other tribe in the Territory, and seem particularly averse to acquiring the habits and customs of the whites" (in Whitner 1977:20). Little progress is recorded in Webster's Annual Report for 1867, though he is staunch in his resolve to eradicate traditional values and practices:

> Their very natures must, however, be changed, and their habits forced, if necessary upon them, or they will retrograde into worse than savage supremacy of filth and disease of former days (ARCIA 1867).

In spite of the Treaty's recognition of whale hunting as an important facet of Makah life, the United States government chose not to support this well-developed practice. Lane (1974) discusses the frustration of several resident Indian agents who realized that federal efforts should be promoting marine activities, rather than agriculture. Some agents believed that assimilating Makahs to American values, customs, and practices would be easier if the government aided traditional marine pursuits.

Lane documents numerous requests for support of fishing activities from 1860-1881 from agents and superintendents. Regardless of the nature of these requests, Lane concludes that "the United States failed to provide the assistance repeatedly requested" (1974:20). Gillis (1974), Lane (1974), Whitner (1977), and Marr (1987) discuss the circumstances surrounding the federal government's promotion of a shift in Makah subsistence from a maritime base to an agricultural one.

In 1870, President Grant's annual message announced an Indian policy which sought to "Christianize and civilize the Indian" (Whitner 1977:18). At this same time, Pacific whale populations were diminishing, and the Makahs who continued to whale hunt had to make adjustments. Singh (1956) and Van Arsdell (1987) indicate that Makahs increased their seal hunting efforts to compensate for a less profitable whale hunt. "Beginning in 1886, Makah crews were hired on sloops and schooners to hunt fur seal off the Washington coast and Vancouver Island (Marr 1987:29). Makah fur seal hunters easily demonstrated their pelagic talents and Makahs quickly used financial profits and exceptional skill to their advantage. Colson (1953:159) reports that "several Makah sealers had their own schooners and were hiring White navigators in the 1890s".

These changes greatly affected traditional subsistence and trading practices. Swan (1884-1887, 2:396) and Waterman (1920:48) both express opinions that the success of Makah fur sealing had an impact on the whale hunt. "This work was so profitable that the Makah temporarily abandoned whale hunting" (Renker and Gunther 1990: 428). Other historians agree. "By 1891, sealing became so lucrative for the Makah and Westcoast native hunters that their traditional whaling expeditions virtually ceased" (Webb 1988:145). A friend of A.W. Smith lamented the decline of the whaling culture in a letter written on 29 November 1888, "Many of our old whalers at Neah Bay have died since we left" (AW Smith Papers).

While the Makah enjoyed the prosperity brought on by their pelagic success, the Pacific fur seal population was showing signs of stress by 1890. The population could not sustain itself in the face of an increasing number of sealers and the use of firearms. The Law of December 30, 1897, made fur sealing illegal; the agent for the Neah Bay agency, Samuel Morse, was directed to enforce this law on the Makah reservation (AW Smith Papers). Accordingly, Makahs would now be allowed to hunt fur seal only from canoes, using traditional gear and techniques. "Some returned to traditional whaling" (Renker and Gunther 1990:428), but the loss of cash from the commercial fur seal hunt created a huge vacuum on the reservation.

While whale hunts were "still the symbolic heart of the culture" (Marr 1987:25), they continued to diminish in frequency, and became less and less cost-effective. In addition, the introduction of American values worked against the traditional subsistence pursuit. For example, the American philosophy of social equality made it difficult for Makahs to continue to staff and organize whaling canoes, and therefore households, according to the ancestral patterns. Whale hunting was no longer the sole avenue to a position of ceremonial and political importance as the headman of a large longhouse.

Epidemics, bans on ceremonial activities, and the federal schooling system also produced devastating effects on the Makah's ability to resume whale hunting after the fur sealing ban. The diseases that affected the Makah population had reduced the number of tribal members by some 75% by 1890 (Boyd 1990:145); much family-owned information was lost as a result. Makahs died without passing down important knowledge. Hancock describes the rapid and disastrous effects of the smallpox epidemic of 1853 in his journal. This epidemic was so severe, it literally wiped the village of **bi?id?a** from the face of the earth.

> It was truly shocking to witness the ravages of this disease here at Neaah (sic) Bay... In a few weeks from the introduction of the disease, hundreds of natives became victims to it, the beach for a distance of eight miles was literally strewn with the dead bodies of these people, presenting a most disgusting spectacle (182).

The extreme number of fatalities caused by the epidemics also disrupted the line of authority in most families. Cultural protocol dictated that ownership of ceremonial and economic rights and privileges had to be transmitted publicly at a potlatch. In many cases, epidemics took the lives of people who had not transmitted control over ceremonial and economic privileges to another person. In many other cases, knowledge of critical components of rituals and ceremonies was abruptly lost. The complicated social structure and ritual life which had existed prior to contact was severely disrupted by the decimation of the Makah population.

The governmental ban on traditional and ceremonial activities added to the social and cultural disruption. Potlatches were illegal by the 1870s (Marr 1987:50), forcing Makahs to move off the reservation or to inaccessible places to hold these important public events. Daniel Dorchester, Superintendent of the Indian Service wrote the following about Agent McGlinn, stationed on the Makah Reservation in 1890:

> This is one of the best officers I have seen in the Indian Service. He knows the Indians remarkably well, understands his business thoroughly, and sticks closely to it. He strictly enforces the regulations of the Department, is breaking up old Indian

> customs, marries the Indians in due forms and records the marriage, and is very strict against intemperance and licentiousness.
>
> The Indians are quite industrious in their way, though rather spasmodic in their labors. They have seasons for berrying, hunting and fishing, and are as dirty and squalid as all fish Indians are. They earn a great deal of money, but have a potlatch system, in which they give away a large amount of money and other articles in feasts... Agent McGlinn is breaking up this custom (ARCIA 1890).

Without the potlatch, the Makahs could not establish important proprietary rights regarding ownership of dances, songs, and other ceremonial and economic privileges. Public transmission of these and other important events for the oral history record could not take place, causing an additional level of social and cultural disruption.

Secret societies were also banned. These complex organizations carried important social functions prior to federal interference. Some secret societies were responsible for healing the sick, while others were important for maintaining social order and punishing transgressors (Ernst 1952). Regardless of the internal function that secret societies served for Makah society and culture, the federal government viewed these activities as savage and demoralizing (Whitner 1977, Marr 1987).

Dances and customs associated with secret societies and winter ceremonials fueled the federal opinion that boarding schools were the only way to eradicate ancestral practices which offended the American sense of morality and decorum. Agents realized that one way to assimilate Makahs and eradicate offensive rituals was to interrupt the transmission of ancestral information within what remained of Makah families. One way they achieved this objective was by separating Makah children from the influence of their family via the use of boarding school. Whitner (1977:28) quotes agent C.A. Huntington as writing, "If the purpose be to civilize these children of darkness, to take them from a barbarous life and put them into a civilized life, the more divorced from the house of their childhood the better".

The United States' policy of assimilation through education increased the socio-cultural confusion. In their attempts to "Kill the Indian but save the man", white educators forced Makah children to leave their families, abandon the Makah language, and adopt white ways of eating, dress, worship, and behavior. Many Makahs who underwent this cultural indoctrination began to feel that traditional activities and beliefs were barbaric, and worked to make their lives more like the non-Indian teachers and administrators who promised modern education, health care and facilities.

In addition to these internal socio-cultural factors, other factors prevented whale hunting from returning to its former prominence. The gray and humpback whale populations were being seriously depleted by non-Makah hunting practices. The population of gray whales was reduced by non-Makah commercial hunters, making offshore hunting in canoes more difficult. Since the Makah style of offshore whaling relied on the ability of land-based lookouts to spot whales which swam close to shore, a lack of these whales effectively decreased the viability of the Makah whale hunt. Only three recorded whale hunts took place during 1905 (AW Smith Papers).

Men could no longer rest assured that the whales would be plentiful, and that canoes at the ready would be called to a hunt by a lookout. In addition, the intensive investment required by a whaler and his crew had not changed; men still had to invest enormous amounts of time in ritual preparation as well as in the care and maintenance of the whaling canoe and other associated gear. Without the plentiful supply of whales which had always graced Makah territory, this intensive investment became too difficult to justify.

So, men turned to a more productive venture that would still make use of the navigation and seafaring skills that both whale and seal hunters needed and used. Fishing had become a more cost effective venture than whaling prior to the turn of the last century.

> The Makahs catch a great many fish, which they ship three times a week to Seattle, where they have a good market for them. They have caught and shipped as high as 10,000 pounds of halibut in one day (ARCIA 1889).

However, offshore whaling in motorized boats was still of interest to American, Canadian, European and Asian parties. As late as 1909, a Seattle based company was considering the establishment of a commercial whaling station at Neah Bay (Webb 1988:177). Plans for the Neah Bay station were eventually abandoned.

After more than a thousand years as whale hunters, Makahs found themselves in a social, ecological and political climate that no longer favored this pursuit. The combined effects of massive epidemics, boarding schools, and government acculturation policies had drastically changed the delicate and complex social dynamic which had supported the traditional Makah whale hunt. The astounding success, then eradication, of the Makah commercial fur seal hunt contributed to this disruption as well. When these two factors are juxtaposed with severely diminishing gray and humpback populations, even subsistence whale hunts became a risky investment. The investment in the Makah whale hunt became even riskier as more Makahs shifted toward the very successful subsistence and commercial venture of ocean fishing.

In spite of these factors, the Makah desire to reinvigorate the whaling tradition never dissipated. Families passed on whaling stories, traditions, and secrets from generation to generation. Whaling designs and crests still decorated public buildings and private homes. Accounts of Makah whalers were read again and again. Whaling displays in the Makah Cultural and Research Center and other museums kept visual scenes in the heads and hearts of Makah people. By 1994, the gray whale population had bounded back to healthy levels; the people in Neah Bay eagerly awaited the opportunity to hunt gray whales again.

THE QUOTA PERIOD

The Makah Tribe has been preparing for this revitalization for decades. Makah people never stopped educating their children about their respective familial whaling traditions. Makah children in the public school on the reservation experienced whaling curriculum every year as a part of the standard school curriculum, as well as through special cultural and linguistic initiatives sponsored by the school district, the Tribe, or any one of a number of funding sources. In fact, collaborative educational efforts through the Makah Cultural and Research Center, the Bilingual program of the Neah Bay School, and other private efforts, have provided whaling curriculum in the schools since the 1960s, with continuous efforts since 1981. While non-Makahs perceived a large temporal gap in the whaling history of the Tribe, tribal members see continuity. Many individuals were patiently waiting for the whaling traditions to be taken from storage and implemented in reality.

The Makah Tribe already has a history of successfully reviving cultural traditions. In the last two decades, the Makah Tribe has reinstituted numerous song, dance, and artistic traditions, and operated a program to restore the Makah language to spoken proficiency on the reservation. These positive accomplishments are due to the enthusiasm, dedication, and knowledge of Makah people, and to the creation of the Makah Cultural and Research Center; this institution manages the cultural resources of the Makah Nation through research, documentation, exhibition and education.

The Makah Tribe created The Makah Cultural and Research Center (MCRC) in response to the massive archaeological collection generated by the Ozette excavation. While the original intent was to create a museum to house the artifacts from the pre-contact levels at Ozette, community opinions shaped the MCRC into a research and education complex that contains numerous exhibition galleries, a language restoration project, archival programs, and a series of educational and interpretive services (Renker and Arnold 1988).

The MCRC has been instrumental in the revival of many Makah traditions. The facility has acted to centralize and incorporate the resources of Tribal government, the Makah community, and other private and public sources to manage Makah cultural resources; many of the resources and traditions that were threatened prior to the creation of the MCRC are now healthy and growing. Consequently, the Makah Tribe had a successful record of bringing ancestral traditions from a dormant state into the active present. The Tribe was confident that the resumption of whaling would be a success, and was not daunted by critics who believed that this tradition could not be reinstated.

On May 17, 1999, the Makah Tribe celebrated a pivotal moment in its long history. At 6:54am, the Creator allowed a Makah crew to realize a collective dream that the Makah Nation had stored in its minds and hearts for seventy long years: they brought a whale home to the Tribe. This pivotal cultural event riveted the attention of the Makah community, and energized Makah Tribal members who believed in, and worked toward, the restoration of this significant cultural practice.

Survey data indicate that some 1200 Makahs watched the climactic moment of the successful hunt on live television. Hundreds of Makahs traveled home to the reservation as soon as they could, wanting to be a part of this significant event. Later that day, some 1400 Makahs welcomed the whale to Front Beach in Neah Bay, and paid honor to the great creature. Many Makahs ate raw blubber right on the spot, and then began the task of preparing the food and resources that the whale contributed to the Makah people.

Butchering the whale proved a huge task for the Makah people. Lack of familiarity with gray whale anatomy, tools which were not well adapted for gray whale meat and blubber, and logistical issues presented immediate obstacles for the butchering process which began on Front Beach. Some confusion also centered on whale parts other than meat and blubber. Most importantly, Makah were able to overcome these problems and continue with the job of processing the whale.

In a matter of hours, a flatbed truck had taken what was left of the whale and driven to the Makah Tribe's fish plant, a processing plant with 800 cubic feet of freezer space and a service entrance large enough to allow the flatbed to drive inside. Within twenty-four hours, Front Beach showed no sign of the momentous event which had happened the previous day. The Makah butchering crew, which included Makahs who had travelled to Alaska to learn processing techniques, had some assistance from a Native Alaskan. Many people worked to butcher the parts of the whale which had not been distributed to Tribal members on the night of 17 May. In addition to meat and blubber, Makahs interviewed during the Makah Household Survey reported requesting and receiving whale lice, sinew, baleen, brain, and heart. Other Makahs reported that they would have liked to receive liver.

cheeks, eyes, and intestines. Some of these items, like whale lice and baleen, are primarily used for ceremonial reasons, while others, can be used in tool production or as food. The bulk of the food products derived from the whale were reserved for the Tribe's celebratory feast, which was to be held on 22 May.

In private homes, people welcomed whale meat, blubber, and other whale parts. Between 17 May and 22 May, some households began to use recipes held in family confidence for decades, and others experimented with techniques used for other sea creatures, like seals and fish. Some 62.9% of Makah households received meat from this whale; 48.4% received blubber. A majority of households which did not receive meat or blubber from this whale reported that they would have welcomed whale products into their homes (Renker 2002).

On 22 May 1999, the Makah Tribe paid tribute to the whale which provided so much to the Tribe, and celebrated a new chapter in its cultural history. Thousands of people attended the parade held during the day, and the feast held in the high school gymnasium later that afternoon. In addition to the local Makahs who attended these events, many Makahs journeyed home to participate.

Unfortunately, this has been the only successful hunt during the quota period. Restrictions on the areas in which Makahs could hunt gray whales, as well as limits on when the hunt could take place hampered efforts to take additional whales as provided by the quota. Further constraints arose from a lawsuit which resulted from a complaint filed in 1997 October. This domestic legal issue halted all Makah whaling for the latter half of 2000 and all of 2001.

Lawsuits were not the only problem that faced the Makah Tribe during this quota period. Four Tribal members alleged that the majority of Makahs were not in favor of the resumption of whaling, and that the Makah Tribal Council had misrepresented the opinion of its people. Fueled by these rumors, anti-whaling advocates staged numerous demonstrations on and off the reservation, and garnered attention from the print and visual media. These efforts also limited the success of the Makah hunt by blocking canoes, scaring whales, and threatening Makah whalers. During the 1999 whaling season, many television spots and published reports contained inaccurate or partially correct information, and included quotes from the anti-whaling Makahs who insisted that the majority of Tribal members did not want the Tribe to hunt whales. These people also accused Makahs of wasting whale products, claiming that tribal members did not like, nor consume whale products. Detractors pointed to alleged wasted meat and blubber from a 1995 whale which was incidentally caught in a fishing net.

Despite these obstacles, more and more Makah men trained to be whale hunters. During the last hunting season prior to the 9 June 2000 court decision, several family-based whaling crews were preparing to hunt, and two family-based crews were granted a total of three permits to go hunting by the local management organization. While no crew brought a whale back to the village, the social benefits of each crew's diligent preparations positively affected dozens of families.

The Makah Reservation in 2002

The contemporary Makah Tribe lives on a 27,151 acre reservation which dominates the northwestern corner of the Olympic Peninsula of Washington State. Other reservation properties include two offshore islands, Tatoosh and Waadah, and a 719 acre parcel of land surrounding the Ozette village site. In addition to these land areas, Makah traditional cultural properties include water territories, like fishing banks, as well (Renker and Pascua 1989). At the time of the Treaty of Neah Bay, Makah traditional cultural properties extended to fishing banks and other ocean grounds as much as 100 miles offshore into the Pacific Ocean. To the north, Makah fisherman accessed rich fishing grounds which are now in Canadian waters, such as Swiftshore and 40-Mile Bank. To the east, Makahs considered the the Strait of Juan de Fuca to be at their disposal to Port Crescent. To the south, Makahs utilized the waters off of Cape Johnson, called **xacic'u?a.** "deep hole". (Swindell 1941, Renker and Pascua 1989).

In 1855, the Tribe signed the Treaty of Neah Bay, which established the boundaries of the reservation but did not recognize the multiple village system. Men negotiating for the Tribe discussed the Makah relationship with the ocean; the Tribe considered the ocean to be territory more important than land. **c'aqa.wi7**, one of these Makah chiefs, articulated this point. "I want the sea. That is my country" (Gibbs 1855). The Indian Claims Commission estimates that "seventy-five to ninety percent of the Tribe's subsistence in 1855 came from the sea rather than land based-mammals or vegetation" (Makah Indian Tribe v. United States, 23 Ind. Cl. Comm. 165, 174 (1970).

Subsequent expansion of the reservation boundaries to include villages other than Neah Bay occurred in 1872 and 1873 via three Executive Orders issued by the United States' government. The village of Ozette was not added to the reservation. Rather, another Executive Order in 1893 created a separate Ozette Reservation to accommodate 64 Makahs who refused to move to Neah Bay (Renker 1994). Today, the Makah Tribal Council is the official governing body of both the Makah Reservation and the Ozette Reservation; the United States Congress ratified the Makah Constitution in 1937 after the Tribe voted to accept the terms of the Indian Reorganization Act in 1936 (Renker 1994).

The Makah Tribe calls itself **q*idicca?a.tx**, "The People Who Live Near the Rocks and the Seagulls". The name Makah is an English version of the term used by a neighboring Tribe for the Makahs. United States' year 2000 census data indicate that there are 1,356 Makahs living in 471 households on the current reservation. Another 1,117 Makahs live away from the reservation (Makah Planning Office 2002). Most reservation residents live in the reservation's single centralized village, Neah Bay, location of the public school, the post office, the general store, the health clinic, and other amenities. While Neah Bay is certainly the hub of reservation activity, a growing population and a housing shortage have encouraged Tribal members to live in more remote reservation locations. Two popular settlements outside Neah Bay are at the sites of former ancestral villages, such as **wa?ac'** (Why-atch) and **c'u.yas** (Tsoo-yess).

Like other locations on the Olympic Peninsula, economic conditions on the reservation have steadily declined since 1989. The Pacific salmon crisis and controversies surrounding timber practices in the area have increased the economic pressure on the reservation population. In addition, the 1989 deactivation of the United States' Air Force Base operating on the Makah Reservation created an employment crisis for the Makah community. Approximately 200 jobs left the reservation when the base closed, and plans to develop a new job source have not yet proved fruitful. In addition, fluctuations in the reservation's natural resources, commercial fishing, tourism, and sport fishing have impaired the Tribe's ability to ensure reliable incomes and subsistence sources for its members. The average unemployment rate on the reservation is approximately 51%, and fluctuates seasonally; almost 49% of reservation households have incomes classified below the federal poverty level, and 59% of the housing units are considered to be substandard (Makah Planning Office 1992). The average household income on the reservation is approximately $5,000.00, compared with approximately $40,000.00 in the rest of the state of Washington (Income 2000, US Census Bureau).

Fishing variations have had an especially drastic effect on Makah families. 95.2% of Makah households have someone in the residence who fishes; 62.8% of these households consider fishing to be the major occupation in the home (Renker 1988). While the decrease in the cash economy of the reservation is a clear result in years of diminished commercial fishing, there is a more insidious affect on the subsistence level.

Ocean fishing has replaced whale hunting as the backbone of Makah household economy. In addition to the cash that fishing generates, another level of economy operates, that of traditional reciprocal systems. Even households without a fisherman derive food, money or other goods from a fisherman who is a relative or a friend. Fish is a medium of exchange on the Makah reservation, and is also an indicator of a fisherman's regard for the individual to whom the fish is given. Indeed, people on the reservation rely on the Makah fleet for substantial contributions to community meals and community functions.

100% of the Makah households on the reservation engage in some kind of reciprocal networks which involve fish at some level of exchange: 80.4% of households receive fish from someone who fishes; 85.3% of households give fish to other family members, friends and community meals; 84.1% of households who smoke fish give it to other family members, friends and community meals; and 35.3% of households receive goods or money from a fisherman when the season is successful (Renker 1988:8).

The 1988 Makah Household Fishing Survey also uncovered another pattern of interest in the Makah community. Over 50% of the reservation households used traditional Makah foods at least once a week; these foods included items like fermented salmon eggs, smoked fish heads and backbones, halibut cheeks and gills, and dried fish (8). 40.2% of Makah households eat fish a few times each week, and 66.7% eat fish at least once each week. These data demonstrate the community's preference for and reliance upon traditional, local, marine foods which are often not favored by the dominant American population.

Recent research available in Aradanas (2001) demonstrates the tenacity of the 1988 subsistence profile. The Makah reliance on seafood products continues to be derived from subsistence traditions, and the existence of redistributive and reciprocal networks remains strong. One striking datum compares the amount of fish consumed in Makah households with that of the average American household. The annual per capita consumption of fin fish and shellfish for the average Makah is a staggering 126 pounds, some eight times the consumption rate for the average American. While fish comprises 55% of the Makah diet, it represents only 7% of the diet of the average American (84).

Recent regulatory and ecological circumstances have had an impact on Makah marine subsistence practices. New, stringent restrictions on salmon fishing, and the yearly fluctuations in fishing quotas, restrict the ability of Makah fisherman to generate a reliable surplus for distribution. This situation has affected many households which rely on surplus fish to meet subsistence needs.

Additional ecological circumstances periodically caused by red tides and oil spills have negatively affected subsistence households which rely on shellfish resources. These events have reduced the ability of Makahs to utilize the shellfish resource as effectively as in the past. Financial compensation awarded to Tribal members as a settlement for the destruction of subsistence shellfish during one of these oil spills can not restore the health of the ecosystem.

Still other factors are affecting subsistence issues pertinent to the Makah Tribe. The Makah Tribe, like many other governmental agencies, cut its operating budget by some 10%* for the 2002 operating year. Cutbacks in food and financial support from public assistance programs affects families which are already economically stressed.

Teen age pregnancies, high school drop outs, substance abuse problems, and an increasing juvenile crime rate indicate that the

Makah community is one still in flux: the enormous social disruption caused by epidemics, boarding schools, and federal policy is still not over. Entire social, cultural, subsistence, and ceremonial institutions were either repressed, eradicated or decimated, and no structural equivalent was substituted. Continuation of the Makah whale hunt would provide the Makah Tribe with a reliable mechanism to repair the damage done to the social infrastructure during the years of forced assimilation. Additional whale hunts would certainly bring important subsistence benefits, as well as other important social considerations.

The Household Whaling Survey (HWS)

As the end of 2001 drew near, the Makah Tribal Council began preparing to submit a request for a new gray whale quota. The Makah Tribal Council wanted to address the concerns of citizens who insisted that Makahs did not support whaling, and that whale products were being frivolously wasted. Clarifying and quantifying the sentiments of enrolled Tribal members was extremely important, so the Makah Tribal Council commissioned a household survey in December 2001. This survey, The Household Whaling Survey (Renker 2002) asked Makahs to report their opinions about the whale hunt, as well as levels of participation in whaling-related activities, including the preparation and consumption of whale products. A copy of the instrument is included in Appendix 2.

Results from the Household Whaling Survey (HWC) were interesting and conclusive. The survey interviewed 34.6% of the Makah households on the reservation. 49.7% of the respondents were male; 50.3% of the respondents were female. 100% of the respondents considered themselves active members of the reservation community, attending a variety of community events, both cultural and otherwise.

The 163 respondents reported information about a population of an additional 268 household members.

Of the 163 respondents, 93.3% believed that the Makah Tribe should continue to hunt whale, 5.5% believed that the Makah Tribe should not hunt whale, and 1.2% were undecided. Clearly, a randomly selected, significant percentage of respondents were supportive of the Makah Tribe's decision to pursue the Treaty Right of hunting a whale that is no longer on the Endangered Species List. It is also interesting to note that three of the respondents who do not want the Makah Tribe to hunt whale do want whale products, like meat, bone, and/or blubber.

When asked to state a reason for this belief, respondents provided a wide variety of opinions. (Because multiple responses were allowed for this question, the positive percentage is based on the number of respondents who answered positively, R= 152.) Of the respondents who felt that the Makah Tribe should continue to hunt whale, 46.1% cited the Treaty Rights as the reason, 35.5%

noted that food, better nutrition, or a traditional diet was the reason, and 36.2% felt that maintaining or restoring some aspect of cultural heritage or tradition was the most important reason. 20.4% indicated that moral or spiritual benefits, such as changed lifestyle, better discipline, or increased pride , should prompt the Makah Tribe to continue to whale.

Respondents also provided a variety of multiple responses to the question, "Do you think whale hunting has been a positive thing for the Tribe?". The most popular response was given by 51.6% of the respondents, who indicated a change for the better in morals or social values: pride, self-esteem, changing lifestyles, abstaining from drugs and alcohol, better male responsibility, and positive role models for youth. 43.8% of respondents considered uniting the Makah Tribe, and other Tribes, as the most positive aspect of whale hunting. Respecting Treaty Rights garnered a response from 25.5% of the respondents, while maintaining or restoring cultural traditions was the reason provided by 32.7% of the respondents.

A surprising number of individuals reported that they were involved in whaling-related activities since the 1999 whale was caught. 38.7% of respondents indicated that they have participated in whaling ceremonial activities, 30.1% have cooked whale, and a resounding 81% reported eating whale products. Respondents related that 70.9% of the household members included in the study ate whale products, and that 21.6% participated in whaling ceremonial activities.

Another significant result that demonstrates overwhelming community support for the Makah whale hunt is found in the question (#45) which asks respondents to indicate subjects about which they would like more information. The majority of respondents wanted information about preparing whale products, and cleaning and carving whale bone. This question also elicited a response that was not planned. 25% of respondents indicated that they would like to share family recipes and techniques for preparing whale meat, rendering oil, and butchering whale. Given the history of secret, family information regarding whale related issues in the Makah Tribe, the fact that respondents volunteered to provide knowledge of practices, techniques, and recipes is a testament to the community's support for the continued use of whale products.

Community support for, and interest in, the Makah whale hunt is also shown by reports of participation in the actual events surrounding the successful 1999 hunt. Of the 163 respondents, 78.5% were watching live television when the whale was taken, as were 67.2% of the respondents' household members. 81.6% of the 163 respondents were present at Front Beach in Neah Bay when the whale was brought ashore, as were 87.6% of the household members. Numerous respondents who did not attend either of these events qualified their response by telling the surveyor that they had to work or were out of town, and would have attended had they been in Neah Bay.

Sixty-four respondents reported that a total of 226 non-resident Makahs billeted in their respective homes from 17 May to 22 May 1999. This datum indicates that Makah support for the whale hunt is not restricted to reservation residents. The Makahs who traveled home to the reservation felt the need to be on ancestral territory, with relatives and friends, and be a witness to the crucial events surrounding the successful whale hunt.

80.4% of the 153 respondents reported attending the Makah Tribe's celebration in honor of the first successful whale hunt in seventy years. 78.6% of these respondents attended the parade early in the day on 22 May, and 95.4% attended the feast later that afternoon. These respondents indicated that 180 (67.2%) of their household members went to the parade, and 191 (71.3%) joined the crowds at the dinner. Levels of participation like those reported here suggest the pride and happiness felt by Makahs who were observing more than the successful hunt; they were celebrating the validation of the traditions and priorities established by ancestors and secured by the signers of the Treaty of 1855.

III. WHALE HUNTING AND THE MAKAH TRIBE: THE NUTRITION COMPONENT

Prior to contact with Europeans, the Makah people used a wide variety of foods. Because of their location on the tip of the Olympic Peninsula, the Tribe was able to exploit land and sea animals, including elk, deer, bear, seal, and a diverse population of fish, shellfish, and other maritime species. In spite of this abundance, "whale meat and oil were among their principal foods" (Densmore 1939:13). Not only were these foods of high status, their role in the nutrition and ceremony of the Makah people cannot be underestimated.

Huelsbeck (1988a:1) estimates that the amount of whale meat, blubber, and oil represented in the faunal assemblage at Ozette indicates that a significant percentage of the food at Ozette could have come from cetaceans. Whale meat was prone to spoil easily, especially when the process of towing a dead animal home took several days. This tendency reduced its importance in the precontact and early historic diet. About 10% of the food Makah people derived from whales can be attributed to meat (1988a:10). Oil however, was not subject to spoilage, and could be kept indefinitely as long as it was rendered properly (Swan 1869).

This important food product was recovered from natural pockets of oil within individual whales, as well as extracted from whale bones and rendered from blubber. Ommanney (1971:55) estimates that some 50% of whale bone weight could be reduced to oil. Faunal remains from Ozette indicate that bones were hacked and gouged to allow oil to both drip from the bones and to be recovered through boiling (Fiskin 1980). Blubber was primarily used as a vehicle to recover oil. Approximately 65% of the weight of blubber is reduced to oil through a rendering process (Huelsbeck 1988a:9).

Oil was an important nutritional item for a variety of reasons. Elders report that whale oil was used as a dip with a variety of foods, including dried fish and herring eggs, as well as potatoes in historic times. Swan(1869) and Densmore(1939) corroborate these accounts. Since dried fish and herring eggs had been processed to remove all natural oils in order to contribute to their longevity, the addition of whale oil added taste as well as nutrients to the precontact and historic Makah diet.

Oil was also the only nutritional product which figured prominently in the ceremonial life of the Makah people. An oil potlatch, given when a whaler had an abundance of oil, demonstrated his generosity with this commodity, and was a rare and special occurrence. Whale oil was the only edible item which could be the focus of a special potlatch, complete with particularized songs and other ceremonial items (Densmore 1939).

While blubber's importance in both precontact and early historic times was clearly as a precursor to oil, "blubber was also eaten, usually cured first" (Densmore 1939:14). It was most popular when broiled next to a fire, and was the standard pacifier for babies, according to oral and ethnographic accounts.

For approximately 2,000 years, the Makah people relied on the nutritional products of the whale, and evolved as a biological population within this context. Archaeological data confirm the fact that Makah people were using whale as a food resource for some 750 years before the technique of hunting whale was developed (Wessen 1990). Faunal remains from a number of sites indicate that Makahs were butchering stranded or drift whales long before the technology to hunt the creatures evolved.

When circumstances prevented the procurement of whale products for subsistence, Makahs compensated by increasing their reliance on other subsistence foods. In spite of the changes that have affected the Makah people, subsistences foods are still an important part of reservation life. Makah hunters still procure land game like elk, deer, and bear to fill winter freezers and reduce cash expenditures. The resources of the sea and the intertidal zones are an important food source (Renker 1988), despite the decreasing abundance described previously.

Recent investigations focusing on the subsistence practices of the Makah Tribe in forest areas (Renker 1994) and the intertidal zone (1993) detailed a viable and thriving culture. Elders described the subsistence philosophy of the Makah people, and stressed the importance of teaching these values to younger people. Younger Makahs participating in these studies were familiar with these teachings, and practiced these subsistence rules when hunting or gathering food.

The most important subsistence strategy to the Makah people is the axiom, "Take only what you need." Makah elders emphasize this principle when the discussion centers on any type of hunting, gathering, or fishing activity (Renker 1993:14). Other common subsistence rules include: 1)choosing the procurement area so that the available biomass is not adversely affected by the amount one needs to harvest, 2) choosing the procurement area that limits the need to travel, and 3) choosing the food to hunt or gather based on the seasons of the food in question; one tries to avoid disturbing reproductive cycles, for example. The continuity of these subsistence practices and values reinforces the social and cultural integrity of the Makah people, and constantly reminds Tribal members of their intimate, and long standing, relationship with the environment.

These subsistence foods and practices are very important when considering the nutritional needs of contemporary Makah people. Modern research concentrating on the nutritional needs of an anthropologically defined population emphasizes " the interactions of genetics, physiological processes, population characteristics, and a wide variety of nutrition-related diseases" (Pelto 1989:x). Using these criteria, a discussion of the profile of the Makah community yields interesting results when the focus is the use of the whale as food.

Consider the following. American Indian people are generally considered to be one of the most unhealthy populations living within the United States of America; this observation is especially true for natives living within the confines of a reservation. The infant mortality and life expectancy rate for reservation residents is the lowest of all American citizens (IHS 1995).

The diminished life expectancy on American Indian reservations is compounded by the fact that certain systemic illnesses linked to food and nutrition appear in statistically higher percentages among these populations. Diabetes, for example, is 234% more prevalent among American Indian people than in all other U.S. races (Indian Health Service 1995: 5). As a matter of fact, "American Indians have the highest rates of diabetes in the world" (NIH 1996:26).

A statistic of this magnitude is especially intriguing when one considers the nutritional history of indigenous American Tribes, and their respective divergence from the food traditions which mark western populations. Prior to contact with Europeans, North American Tribal people consumed foods which were native to their respective environments. Natives of the Great Plains and the Pacific Northwest were hunters and gatherers who utilized the plant and animal species which lived in and migrated through their territories. Natives of the Southwest and the Northeast augmented nature's bounty by cultivating crops, most of which were not available in Europe. (It is interesting to note that Makah people did not utilize plant foods to a great degree (Gill 1983), and still experience many digestive problems with diets high in fiber and cruciferous vegetables (IHS 1991).)

When traditional Tribal life was disrupted by contact with non-Natives, food traditions were some of the first to be affected. By the time the Treaties called for the forced placement of Tribal people on reservations in the 1850s, very few Tribes could still practice the subsistence patterns which had sustained their ancestors.

Hunting and gathering tribes were restricted because their ability to utilize former usual and accustomed resource areas was diminished; the reservation system made it possible for non-Native populations to acquire and control lands and waters once available to Tribes. Through Treaties, agricultural tribes lost valuable land capable of cultivation to non-Indian farmers, and were given less productive reservation land as compensation. Additional stresses on native food traditions appeared when the American westward expansion and growing commercial interests decimated food animals once plentiful before contact.

No matter what the individual Tribal food tradition, professionals in the health and social science fields appear to agree that the introduction of western foods like refined sugar and flour, beef, and lard have had a dramatic negative effect on the health of American Tribal members in general. Many of these foods were distributed to reservation natives by the American government in the form of annuities and supplies. Specific studies have directly linked the introduction of western foods into the diet of Tribal entities to a variety of health problems (Hildes 1966:501, Keenleyside 1990:13, NIH 1996, and others).

American health organizations such as The National Institutes of Health (NIH), the National Institute of Diabetes and Digestive and Kidney Diseases, the Public Health Service, and the Department of Health and Human Services, are conducting research to try to determine why American Indian populations are subject to food related illnesses at a rate so much greater than the rest of the population. In many cases, reservation residents contract these illnesses at about half the age of Caucasians, according to the Indian Health Service (1995).

Many current studies are now investigating the link between genetics and the acquisition of nutrition related illness. The most important of these studies focuses on the Pima Indians of Arizona, a group with a food tradition dating back some 2,000 years; their traditional diet and lifestyle were disrupted about 200 years ago, causing major social and nutritional changes. The high rates of diabetes and obesity in this Tribe prompted the National Institutes of Health and several other American health organizations to undertake a long-term study of this population.

Thirty years of concerted studies with the Pima people have demonstrated results applicable to other Tribal people in North America, including the Makah. Research indicates that discrete populations evolve a genetic code that is uniquely suited to a particular environment and its food resources. This genetic code regulates the biochemical processes in the body that produce enzymes, proteins, fatty acids, and thousands of other chemicals which function within the human body. Scientists developing the genetic map for the Pima people have already identified a number of genetic variations within this community that are different from those in the white population (NIH 1996:6). These variations may explain why Pima people eating western foods are more prone to develop diabetes, obesity, and the long-term consequences of these health problems than other populations.

Like the Pima people, Makahs found their traditional pattern of food use interrupted by western contact about 200 years ago. The traditional diet rich in fish and sea mammal oils was gradually replaced by a western diet which considered beef, dairy products, and cereals to be the most nutritious. The whale products which once comprised a principal part of the diet were no longer available, and the whale oil which supplemented the preserved foods of the winter season was replaced by butter and margarine. A high proportion of lactose intolerance became apparent in the

Makah community, a fact not surprising for a population with no previous historic or cultural link to cattle or dairy animals (NIH 1996).

Given this perspective, certain IHS data become especially intriguing. For example, Indian people of the Northwest Coast have the highest rate of digestive illnesses of all American Indian people. Such illnesses comprise the leading cause of hospitalization for native people in this area. For northwest people, 16.5 % of all hospitalizations pertained to digestive diseases, compared to the next highest rate of 12.3% for Navajo people (Indian Health Service 1995). And, in terms of overall nutritional health, Makah and northwest people are at a potential genetic disadvantage because these populations evolved without a reliance on high fiber, low fat foods, like the Pimas.

Consequently, the reintroduction of whale products, especially whale oil, may produce dramatic results in the health of the Makah people. Current research in the importance and application of Essential Fatty Acids (EFAs), such as those found in sea mammals and fish oils, support the contention that the inclusion of whale oil in the Makah diet may have crucial implications for the health of the Makah community. This fact is not as surprising as it may seem when one considers the historic western use of products like cod liver oil as an important nutritional supplement.

For example, the Washington Office of the Superintendent of Public Instruction (OSPI) details the fact that Makah children attending public school on the reservation exhibit Attention Deficit Disorder (ADD), Attention Deficit Hyperactivity Disorder (ADHD), reading disabilities, and dyslexia at a rate almost twice that of the rest of the population (1996). Clinical studies which focused on the correlation between EFAs and these conditions report that children receiving supplemental EFAs demonstrate significant improvement in the ability to pay attention and read effectively (Stevens, Zentall, et al:1995; Stordy:1995).

In addition, marine EFAs have been clinically demonstrated to improve conditions like rheumatoid arthritis (Belch, Amsell, Madho, Dowd, and Sturrock:1988) and diabetic neuropathy (Keen, Payan, Walker,et al:1993). Both conditions are prevalent in the Makah community and especially within descendants of whaling families.

Whale oil and whale products may be the answer to these problems within the Makah community, and may provide researchers with an analogous study situation to that within the Pima community. Marine fish like salmon are becoming more scare within Makah households due to increasingly stringent quotas which disrupt traditional systems of reciprocity (Renker 1988). Consequently, access to whale products could provide Makahs with a nutritional remedy to many community health problems.

Access to whale products can provide the Makah community with important nutritional opportunities that carry implications for non-Makahs. Like their Pima counterparts, Makahs may be able to augment knowledge about the relationship between genetic patterns, nutrition, and health, especially in the area of EFAs. Community members are ready to rise to this challenge and re-learn the techniques necessary to make the food from the whale a part of Makah life again.

This section is not intended to imply that we can scientifically elucidate the nutritional advantages of whale products, especially oil, for the Makah Tribe. However, recent national studies provide some points of interest. Investigations of local populations with a demonstrable time depth indicate that regional genetic factors evolve in order to maximize the dynamic relationship between certain foods and the patterns in which these foods are consumed by subsistence populations. Consequently, it is reasonable to assume that increasing the consumption of locally available foods consumed through the millenia could confer substantial health benefits.

Such is the case for whale products and the Makah Tribe. The food products of the gray whale have sustained the Makah people for over 2,000 years; the Tribe has been less culturally and physically healthy since this access was restricted seventy years ago. A restoration of the ability to hunt the gray whale will provide the Makah Tribe with a key element of its culture that has been able to exist only in the flickering images of oral history for seven decades. The social fabric of the community will be able to patch its thin areas once the hunt is restored, and the physical health of the Makahs will increase once there is enough whale meat and oil to feed its children.

In addition, the addition of whale products will help to replace other subsistence resources which are in decline. As fish and shellfish quantities decrease on the reservation, the availability of whale products will prevent people from having to spend precious cash to replace current subsistence foods.

The resumption of the whale hunt will provide more than subsistence foods for the body. It will provide spiritual subsistence to the soul of the Makah people.

APPENDIX 1

MAKAH ALPHABET

The Makah alphabet variation used in this document is a function of printer and software limitations. The Makah alphabet is a variation of the International Phonetic Alphabet, and is presented in Renker (1987). No capital letters are used in this alphabet.

The following substitutions are used:

= IS EQUIVALENT TO A BARRED L

7 IS EQUIVALENT TO A BARRED LAMBDA

* IS EQUIVALENT TO A RAISED W

' IS EQUIVALENT TO A GLOTTAL MARK

? IS EQUIVALENT TO A GLOTTAL STOP

. IS EQUIVALENT TO A LENGTH MARKER

APPENDIX 2

CONFIDENTIAL HOUSEHOLD WHALING SURVEY

This survey is commissioned and sanctioned by the Makah Tribal Council, and is being administered by the Makah Cultural and Research Center. The data from this survey will be used in creating the new Needs Statement. This document will be a part of the United States' request to provide the Makah Tribe with another five year quota to hunt gray whales; the request is made to the International Whaling Commission.

Your name and the information you provide are strictly confidential. No information you provide will be linked directly to you in the Needs Statement. In fact, the author of the Needs Statement will not even know who has answered these surveys.

The completed surveys will be sealed and placed in the Archives of the Makah Cultural and Research Center. Access to these documents will be restricted by the Makah Tribal Council.

The respondent for this survey must be a Makah who is 21 years of age or more. For the purposes of this survey, a household member is considered to be any person that is residing in your house at the time of this interview. This survey is interested in the Makah members of your household.

ABOUT YOU AND YOUR MAKAH HOUSEHOLD MEMBERS...

1. Are you Makah? Yes ________ No ________

   Age ____________ Gender ________________

2. Do you have any Makahs living in your household? Yes _____ No ____

   How many? ______________

   If yes, complete 2a. If no, skip to 3.

2a. List all Makahs by relationship, gender, and age.

3. Where were you born? ________________________

4. Do you attend Neah Bay village events? Yes ________ No ________

4a. If yes, please check all that apply.

Sporting Events ____________________

Community Dinners ________________

Potlatches __________________________

Health Presentations ________________

Makah Days Events __________________

MTC Quarterly/Annual Meetings __________

Neah Bay K-12 School Events ____________

Other (Please specify) ________________________

ABOUT YOUR MAKAH HOUSEHOLD MEMBERS AND WHALING IN 1999...

5. Were you watching television when the 1999 whale was harpooned and killed?
Yes ____________ No ______________

6. Were any of your Makah household members watching TV when the 1999 whale was harpooned and killed?
Yes ____________ No ______________

7. If yes, how many Makah household members were watching TV when the 1999 whale was harpooned and killed?
____

8. Were you on Front Beach, or in a boat/canoe on the water, when the 1999 whale was brought ashore?
Yes ____________ No ______________

9. Were any of your Makah household members on Front Beach or in a boat/canoe on the water, when the 1999 whale was brought ashore?
Yes ____________ No ______________

10. If yes, how many? ______________________

11. Did any Makahs who live off the reservation come to spend the night at your house from May 17, 1999, the night the whale came ashore, to May 22, 1999, the night of the Tribe's celebration?
Yes ___________ No ________________

12. If yes, how many non-resident Makahs spent the night at your house from May 17, 1999 till May 22, 1999.

____

13. Did you attend the Makah Tribe's celebration of the 1999 whale on May 22, 1999?

Yes __________ No __________

14. If yes, which events? Check all that apply.

Parade ________________

Dinner ________________

15. If you attended the dinner, in which way did you participate? Check all that apply.

Attended the dinner ________________

Helped butcher the whale ______________

Helped cook the whale ______________

Helped cook other items at the dinner __________

Helped serve at the dinner ________

Helped set up the gym _______

Helped decorate the gym ________

Sang at the dinner ___________

Other (Please specify) _____________

16. Did any of your Makah Household members attend the Makah Tribe's celebration of the 1999 whale on May 22, 1999?

Yes __________ No __________

17. If yes, how many Makah household members attended the Makah Tribe's celebration of the 1999 whale on May 22, 1999? ______________

18. For each Makah household member, please check which events s/he attended. Check all that apply.

	#1	#2	#3	#4	#5	#6
Parade						
Dinner						

19 If Makah household members attended the dinner, in which way did each participate? Check all that apply.

	#1	#2	#3	#4	#5	#6
Attend the dinner						
Helped butcher the whale						
Helped cook the whale						
Helped cook other dinner items						
Helped serve at the dinner						
Helped set up the gym						
Sang at the dinner						
Other (Please specify)						

20. Did your household receive meat from the 1999 whale?
Yes____________ No______

If no, skip to question 23.

21. What did you do with the meat? (Check all that apply.)

Prepare it _______________

Redistribute it _____________

other ______________________

22. If you prepared it, what did you do? (Check all that apply.)

Jerky ___________

Roasts __________

Stew ____________

Steaks __________

Smoked meat _______

Other (Please specify) ___________________

Now skip to question 24.

23. Would you have liked to get meat from this whale?
Yes ____________ No _________________

24. Did your household receive blubber from the 1999 whale?
Yes ____________ No __________________

If no, skip to question 27.

25. What did you do with the blubber? (Check all that apply.)

Prepare it ___________

Redistribute it ________

Other ________________

26. If you prepared it, what did you do? (Check all that apply.)

Smoked it ________________

Rendered it ______________

Ate it raw _______________

Pickled it _______________

Boiled it ________________

Cosmetics ________________

Other (Please specify.) ____________________________

Now skip to question 28.

27. Would you have liked to receive blubber from the 1999 whale?

Yes ________________ No ________________

28. Did your household receive whale oil from someone as a result of the 1999 whale?

Yes ________________ No ________________

29. Did your household receive any other parts from the 1999 whale?

Yes ________________ No ________________

30. If yes, what parts did your household receive? What did you do with them?

31. Were there any other parts of the 1999 whale you would have liked your household to receive?

Yes ________________ No ________________

32. If yes, which ones?

ABOUT YOUR MAKAH HOUSEHOLD AND OTHER WHALING ACTIVITIES...

33. Would you like to have whale oil in your household on a regular basis?

Yes ________________ No ________________

34. Would you like to have whale meat in your household on a regular basis?

Yes ________________ No ________________

35. Would you like to have whale blubber in your household on a regular basis?

Yes ________________ No ________________

36. Would you like to have whale bone in your household on a regular basis?

Yes ________________ No ________________

37. Please check all whaling activities that you have been involved in since the 1999 whale was caught.

Member of whaling crew ____________

Member of Whaling Commission ________________

Butchering whale _________________

Cooking whale _______________

Smoking whale _______________

Rendering oil___________________

Eating whale products _________________

Redistributing whale products to other Makahs___________

Participating in whaling ceremonial activities _____________

Carving whale bone ______________

Member of whaling support crew ___________________

Other (Please specify.) __________________

38. Please check all whaling activities that any HH members have been involved in since the 1999 whale was caught. Please specify for each household member.

	#1	#2	#3	#4	#5	#6
Member of whaling crew						
Member of Whaling Commission						
Butchering whale						
Cooking whale						
Smoking whale						
Rendering oil						
Eating whale products						
Redistributing whale products						
Participating in whaling ceremonial activities						
Carving whale bone						

Member of whaling support crew

Other (Please specify.)

ABOUT YOUR OPINIONS REGARDING WHALE HUNTING...

39. Should the Tribe continue to hunt whale? Yes ________ No ________

40. What are the reasons for your answer?

41. If you answered yes to 39, do you think whale hunting has been a positive thing for the Tribe? Yes ___________ No ___________

42. What are your reasons for this answer?

43. Would you like to have more access to whale products in the future?

    Yes ______________ No ______________

If yes, go to 44. If no, go to 45.

44. Which whale products would you like more of in the future?

    raw meat ______________________

    meat cooked or preserved by someone else ___________

    raw blubber ______________

    whale oil ______________

    bone ____________

other (specify) ____________

45. Would you like more information about any of the following? Check all that apply.

Whale hunting ____________

Cooking whale meat ______________

Butchering whale ___________

Rendering oil ______________

Smoking meat _____________

Cleaning whale bone ____________

Carving whale bone __________

Other (Specify) __________

46. Are there any other comments you would like to make?

APPENDIX 3

MAKAH HOUSEHOLD SURVEY METHODOLOGY

The survey was administered by the Makah Cultural and Research Center, an institution with twenty-two years of experience conducting household surveys on the Makah Reservation. The author of the instrument conducted numerous household surveys in the Makah community over the last twenty-two years; each of these surveys employed the same methodology. Results were tabulated and analyzed by the developer of the survey instrument.

In order to conduct the most accurate survey possible, the Household Whaling Survey is based on the following:

1. Names of households to be surveyed were drawn randomly from the Makah Tribe's Turkey Distribution List. This list contains all households on the reservation in which at least one enrolled Makah resides. 34.6% of the Tribe's 471 Makah households were interviewed.

2. All surveys were conducted in person by an enrolled Makah trained in proper survey procedures, who insured all respondents that confidentiality would be protected.

3. The survey contacted 217 of the Tribes 471 households. Of this number, 159 households agreed to be interviewed. Interestingly enough, four of the Makahs who publicly challenged the Tribe's decision to whale had their respective names randomly drawn to be surveyed. Because the Tribe wanted to minimize external influences on the survey administration, these four individuals were not surveyed. However, to maintain proper responses, these individuals were marked to answer negatively to all questions which asked for positive or negative opinions regarding Makah whaling, access to whale products, and use of whale products, as per their publically expressed opinions. Question marks indicate responses for which the survey had no information at all.

   Counting these four individuals, the total number of respondents for the survey is tallied at 163. Percentages are tallied accordingly. Five household volunteered to be included in the survey. While these households were encouraged to complete a survey form, these five respondents were NOT included in the random population of 163.

4. All survey respondents had to be enrolled Makahs with a reservation household; all respondents also had to be twenty-one years of age or older. Survey methodology assumes that each respondent is capable of answering questions about his/her own ideas and activities regarding whaling, as well as the activities of his/her household members regarding whaling.

5. A master list which related each chosen household to an exclusive number was kept at the Makah Cultural and Research Center to avoid duplication and protect confidentiality. Surveyors returned completed surveys to the Makah Cultural and Research Center, which maintained security for the documents. All completed surveys are archived at the Makah Cultural and Research Center.

6. The author/tabulator did not know the names of the respondents, and related to surveys by number only.

7. Certain questions allowed for multiple responses. Others did not. In addition, certain questions only allowed respondents who had answered a previous question a particular way to answer. Incidents of both types are indicated on the survey instrument, which is appended in 2. On the tabulation sheet, the base number of respondents is indicated by R= . R=163 means that the percentage is calculated based on the answers of 163 respondents.

8. Internal checks and balances were placed in the instrument to encourage data validity.

9. Answers are reported as percentages calculated from the base number of respondents appropriate to each question. Percentages are rounded to the nearest tenth.

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TREATY WITH THE MAKAH, 1855.

Jan. 31, 1855.

12 Stat., 939. Ratified Mar. 8, 1859. Proclaimed Apr. 18, 1859.

Articles of agreement and convention, made and concluded at Neah Bay, in the Territory of Washington, this thirty-first day of January, in the year eighteen hundred and fifty-five, by Isaac I. Stevens, governor and superintendent of Indian affairs for the said Territory, on the part of the United States, and the undersigned chiefs, head-men, and delegates of the several villages of the Makah tribe of Indians, viz: Neah Waatch, Tsoo-Yess, and Osett, occupying the country around Cape Classett or Flattery, on behalf of the said tribe and duly authorized by the same.

Surrender of lands to the United States.

Boundaries.

ARTICLE 1. The said tribe hereby cedes, relinquishes, and conveys to the United States all their right, title, and interest in and to the lands and country occupied by it, bounded and described as follows, viz: Commencing at the mouth of the Oke-ho River, on the Straits of Fuca; thence running westwardly with said straits to Cape Classett or Flattery; thence southwardly along the coast to Osett, or the Lower Cape Flattery; thence eastwardly along the line of lands occupied by the Kwe-déh-tut or Kwill-eh-yute tribe of Indians, to the summit of the coast-range of mountains, and thence northwardly along the line of lands lately ceded to the United States by the S'Klallam tribe to the place of beginning, including all the islands lying off the same on the straits and coast.

Reservation.

Boundaries.

ARTICLE 2. There is, however, reserved for the present use and occupation of the said tribe the following tract of land, viz: Commencing on the beach at the mouth of a small brook running into Neah Bay next to the site of the old Spanish fort; thence along the shore round Cape Classett or Flattery, to the mouth of another small stream running into the bay on the south side of said cape, a little above the Waatch village; thence following said brook to its source; thence in a straight line to the source of the first-mentioned brook, and thence following the same down to the place of beginning; which said tract shall be set apart, and so far as necessary surveyed and marked out for their exclusive use; nor shall any white man be permitted to reside upon the same without permission of the said tribe and of the superintendent or agent; but if necessary for the public convenience, roads may be run through the said reservation, the Indians being compensated for any damage thereby done them. It is, however, understood that should the President of the United States hereafter see fit to place upon the said reservation any other friendly tribe or band to occupy the same in common with those above mentioned, he shall be at liberty to do so.

Whites not to reside thereon unless, etc.

Roads may be made.

Other friendly bands may be placed thereon.

Indians to settle on reservation within a year.

ARTICLE 3. The said tribe agrees to remove to and settle upon the said reservation, if required so to do, within one year after the ratification of this treaty, or sooner, if the means are furnished them. In the mean time it shall be lawful for them to reside upon any land not in the actual claim and occupation of citizens of the United States, and upon any land claimed or occupied, if with the permission of the owner.

Rights and privileges secured to Indians.

Proviso.

ARTICLE 4. The right of taking fish and of whaling or sealing at usual and accustomed grounds and stations is further secured to said Indians in common with all citizens of the United States, and of erecting temporary houses for the purpose of curing, together with the privilege of hunting and gathering roots and berries on open and unclaimed lands: *Provided, however*, That they shall not take shell-fish from any beds staked or cultivated by citizens.

Payments by the United States.

ARTICLE 5. In consideration of the above cession the United States agree to pay to the said tribe the sum of thirty thousand dollars, in the following manner, that is to say: During the first year after the ratification hereof, three thousand dollars; for the next two years, twenty-five hundred dollars each year; for the next three years, two thousand dollars each year; for the next four years, one thousand five hundred dollars each year; and for the next ten years, one thousand dollars each year; all which said sums of money shall be applied to the use and benefit of the said Indians, under the direction of the President of the United States, who may from time to time determine at his discretion upon what beneficial objects to expend the same. And the superintendent of Indian affairs, or other proper officer, shall each year inform the President of the wishes of said Indians in respect thereto.

How to be applied.

ARTICLE 6. To enable the said Indians to remove to and settle upon their aforesaid reservation, and to clear, fence, and break up a sufficient quantity of land for cultivation, the United States further agree to pay the sum of three thousand dollars, to be laid out and expended under the direction of the President, and in such manner as he shall approve. And any substantial improvements heretofore made by any individual Indian, and which he may be compelled to abandon in consequence of this treaty, shall be valued under the direction of the President and payment made therefor accordingly.

Appropriation for removal and for clearing and fencing land, etc.

ARTICLE 7. The President may hereafter, when in his opinion the interests of the Territory shall require, and the welfare of said Indians be promoted thereby, remove them from said reservation to such suitable place or places within said Territory as he may deem fit, on remunerating them for their improvements and the expenses of their removal, or may consolidate them with other friendly tribes or bands; and he may further, at his discretion, cause the whole, or any portion of the lands hereby reserved, or such other land as may be selected in lieu thereof, to be surveyed into lots, and assign the same to such individuals or families as are willing to avail themselves of the privilege, and will locate thereon as a permanent home, on the same terms and subject to the same regulations as are provided in the sixth article of the treaty with the Omahas, so far as the same may be practicable.

Indians may be removed from the reservation.

Tribes may be consolidated.

Ante, p. 612.

ARTICLE. 8. The annuities of the aforesaid tribe shall not be taken to pay the debts of individuals.

Annuities of tribe not to pay individual debts.

ARTICLE 9. The said Indians acknowledge their dependence on the Government of the United States, and promise to be friendly with all citizens thereof, and they pledge themselves to commit no depredations on the property of such citizens. And should any one or more of them violate this pledge, and the fact be satisfactorily proven before the agent, the property taken shall be returned, or in default thereof, or if injured or destroyed, compensation may be made by the Government out of their annuities. Nor will they make war on any other tribe except in self-defence, but will submit all matters of difference between them and other Indians to the Government of the United States or its agent for decision and abide thereby. And if any of the said Indians commit any depredations on any other Indians within the Territory, the same rule shall prevail as that prescribed in this article in case of depredations against citizens. And the said tribe agrees not to shelter or conceal offenders against the United States, but to deliver up the same for trial by the authorities.

Indians to preserve friendly relations.

To pay for depredations.

Not to make war, except.

To surrender offenders.

ARTICLE 10. The above tribe is desirous to exclude from its reservation the use of ardent spirits, and to prevent its people from drinking the same, and therefore it is provided that any Indian belonging thereto who shall be guilty of bringing liquor into said reservation, or who drinks liquor, may have his or her proportion of the annuities withheld from him or her for such time as the President may determine.

Annuities to be withheld from those drinking ardent spirits.

ARTICLE 11. The United States further agree to establish at the general agency for the district of Puget's Sound, within one year from the ratification hereof, and to support for the period of twenty years, an agricultural and industrial school, to be free to children of the said tribe in common with those of the other tribes of said district and to

United States to establish an agricultural, etc., school for the Indians; to provide tools and employ mechanics, etc.

provide a smithy and carpenter's shop, and furnish them with the necessary tools and employ a blacksmith, carpenter and farmer for the like term to instruct the Iindians in their respective occupations. *Provided, however*, That should it be deemed expedient a separate school may be established for the benefit of said tribe and such others as may be associated with it, and the like persons employed for the same purposes at some other suitable place. And the United States further agree to employ a physician to reside at the said central agency, or at such other school should one be established, who shall furnish medicine and advice to the sick, and shall vaccinate them; the expenses of the said school, shops, persons employed, and medical attendance to be defrayed by the United States and not deducted from the annuities.

A physician, etc.

The tribe is to free all slaves and not to acquire others.

ARTICLE 12. The said tribe agrees to free all slaves now held by its people, and not to purchase or acquire others hereafter.

Not to trade out of the United States.

Foreign Indians not to reside on the reservation.

ARTICLE 13. The said tribe finally agrees not to trade at Vancouver's Island or elsewhere out of the dominions of the United States, nor shall foreign Indians be permitted to reside in its reservation without consent of the superintendent or agent.

When treaty to take effect.

ARTICLE 14. This treaty shall be obligatory on the contracting parties as soon as the same shall be ratified by the President of the United States.

In testimony whereof, the said Isaac I. Stevens, governor and superintendent of Indian affairs, and the undersigned, chiefs, headmen and delegates of the tribe aforesaid have hereunto set their hands and seals at the place and on the day and year hereinbefore written.

Isaac I. Stevens, governor and superintendent. [L. S.]

Tse-kauwtl, head chief of the Makah tribe, his x mark. [L. S.]
Kal-chote, subchief of the Makahs, his x mark. [L. S.]
Tah-a-howtl, subchief of the Makahs, his x mark. [L. S.]
Kah-bach-sat, subchief of the Makahs, his x mark. [L. S.]
Kets-kus-sum, subchief of the Makahs, his x mark. [L. S.]
Haatse, subchief of the Makahs, his x mark. [L. S.]
Keh-chook, subchief of the Makahs, his x mark. [L. S.]
It-an-da-ha, subchief of the Makahs, his x mark. [L. S.]
Klah-pe-an-hie, or Andrew Jackson, subchief of the Makahs, his x mark. [L. S.]
Tsal-ab-oos, or Peter, Neah village, his x mark. [L. S.]
Tahola, Neah village, his x mark. [L. S.]
Kleht-li-quat-stl, Waatch village, his x mark. [L. S.]
Too-whaii-tan, Waatch village, his x mark. [L. S.]
Tahts-kin, Neah village, his x mark. [L. S.]
Nenchoop, Neah village, his x mark. [L. S.]
Ah-de-ak-too-ah, Osett village, his x mark. [L. S.]
William, Neah village, his x mark. [L. S.]
Wak-kep-tup, Waatch village, his x mark. [L. S.]
Klaht-te-di-yuke, Waatch village, his x mark. [L. S.]
Oobick, Waatch village, his x mark. [L. S.]
Bich-took, Waatch village, his x mark. [L. S.]
Baht-se-ditl, Neah village, his x mark. [L. S.]
Wack-shie, Neah village, his x mark. [L. S.]
Hah-yo-hwa, Waatch village, his x mark. [L. S.]
Daht-leek, or Mines, Osett village, his x mark. [L. S.]
Pah-hat, Neah village, his x mark. [L. S.]
Pai-yeh, Osett village, his x mark. [L. S.]
Tsah-weh-sup, Neah village, his x mark. [L. S.]
Al-is-kah, Osett village, his x mark. [L. S.]
Kwe-tow'tl, Neah village, his x mark. [L. S.]
Kaht-saht-wha, Neah village, his x mark. [L. S.]
Tchoo-quut-lah, or Yes Sir, Neah village, his x mark. [L. S.]
Klatts-ow-sehp, Neah village, his x mark. [L. S.]
Kai-kl-chis-sum, Neah village, his mark. [L. S.]
Kah-kwt-lit-ha, Waatch village, his x mark. [L. S.]
He-dah-titl, Neah village, his x mark. [L. S.]
Sah-dit-le-uad, Waatch village, his x mark. [L. S.]
Klah-ku-pihl, Tsoo-yess village, his x mark. [L. S.]
Billuk-whtl, Tsoo-yess village, his x mark. [L. S.]
Kwah-too-qualh, Tsoo-yess village, his x mark. [L. S.]
Yooch-boott, Tsoo-yess village, his x mark. [L. S.]
Swell, or Jeff. Davis, Neah village, his x mark. [L. S.]

MAKAH TRIBE

P.O. BOX 115 • NEAH BAY, WA 98357 • 360-645-2201

The Makah Tribe is an equal opportunity employer.

RESOLUTION NO.: **17-05**
DATE ENACTED: **02-03-05**

RESOLUTION NO. 17-05 OF THE MAKAH TRIBAL COUNCIL

WHEREAS, the Makah Tribal Council is the governing body of the Makah Indian Tribe of the Makah Indian Reservation, Washington, by authority of the Constitution and Bylaws of the Makah Indian Tribe as approved on May 16, 1936, by the Secretary of the Interior; and

WHEREAS, the Makah Tribe has a documented whaling tradition and has depended on whaling as the basis of its economy, subsistence, and culture for at least 1,500 years; and

WHEREAS, the 1855 Treaty of Neah Bay secures in perpetuity the Tribe's right of taking fish and whaling and sealing at all usual and accustomed grounds and stations; and

WHEREAS, the June 7, 2004 second amended opinion by the Ninth Circuit Court of Appeals on *Anderson v. Evans* 371 F.3d 475 (9th Cir. 2004) requires the Makah Tribe to seek a waiver and/or permit under the Marine Mammal Protection Act (MMPA) in order to exercise the whaling rights secured in the Treaty of Neah Bay.

NOW THEREFORE BE IT RESOLVED the Chairman of the Makah Tribal Council is authorized to submit the attached application under Section 101(a)(3) of the Marine Mammal Protection Act (MMPA), 16 U.S.C. § 1371(a)(3), to the National Oceanic and Atmospheric Administration for a waiver of the moratorium on the taking of taking of marine mammals which would allow the Tribe to conduct a Treaty ceremonial and subsistence (C&S) harvest of up to 20 gray whales from the Eastern North Pacific (ENP) stock in a five-year period, with a maximum of five whales per year.

MAKAH TRIBAL COUNCIL

Ben Johnson Jr

Ben Johnson, Jr.
Chairman

CERTIFICATION

The foregoing Resolution was adopted at a regular meeting held on February 3, 2005, at which a quorum was present, and the Resolution was adopted by a vote of _3__ FOR and _0__ AGAINST, the Chairperson, or the Vice-Chairperson in his absence, being authorized to sign the Resolution.

By: JoDean Haupt-Richards
Tribal Secretary

MAKAH TRIBE

P.O. BOX 115 • NEAH BAY, WA 98357 • 360-645-2201

January 24, 2006

William T. Hogarth, Ph.D.
Assistant Administrator
National Oceanic and
Atmospheric Administration
Room 14636
1315 East-West Hwy
Silver Spring, MD 20910

Re: Makah Tribe's clarification of MMPA waiver request application

Dear Dr. Hogarth,

On February 11, 2005, the Makah Tribal Council (Tribe) submitted a request to the National Marine Fisheries Service (NMFS) for a waiver of the Marine Mammal Protection Act (MMPA) take moratorium that would allow a limited harvest from the Eastern North Pacific stock of gray whales as secured in the 1855 Treaty of Neah Bay. We specified in the 2005 request that the total take of gray whales for which the Tribe seeks a waiver is up to 20 gray whales in any five-year period, subject to a maximum of five gray whales in any calendar year.

While our prior request focused on the MMPA waiver and also sought a simultaneous review under the National Environmental Policy Act (NEPA), we recognize that NMFS must analyze the proposed hunting activities in the context of additional laws and regulations. This letter clarifies that the Tribe is asking NMFS to analyze the 2005 request to conduct Treaty ceremonial and subsistence hunting of gray whales under whatever authorities it may deem applicable. In making this request, the Tribe reserves its right to contest a future determination by the United States government that a particular law or regulation may be applied to restrict the Tribe's ability to exercise its whaling rights under the Treaty of Neah Bay.

Sincerely,

MAKAH TRIBAL COUNCIL

Ben Johnson Jr

Ben Johnson, Jr.
Chairman

CC: Robert Lohn, NMFS Northwest Regional Administrator
Stanley Speaks, BIA Northwest Regional Director

Resolution No. 57-01
Date Enacted 5-30-01
Subject Matter: Makah Gray Whale Management Plan Amendments

RESOLUTION NO. 57-01 OF THE MAKAH TRIBAL COUNCIL

WHEREAS, the Makah Tribal Council is the governing body of the Makah Indian Tribe of the Makah Indian Reservation, Washington, by authority of the Constitution and By-Laws of the Makah Indian Tribe as approved on May 16, 1936, by the Secretary of the Interior;

WHEREAS, the Treaty of Neah Bay secures in perpetuity the Tribe's right of taking fish and whaling and sealing at all usual and accustomed grounds and stations;

WHEREAS, on. October 23, 1997, the! International Whaling Commission approved the Makah Tribe's request for an aboriginal subsistence quota of 20 gray whales which my be taken between the years 1998 and 2002;

WHEREAS, on January 341998, the Council adopted Resolution No. 67-98 which adopted the Management Plan for Makah Treaty Gray Whale Hunting for the Years 1998-2002;

WHEREAS, after consultation with the Makah Whaling Commission and the National Marine Fisheries Service, the Council has determined that it is necessary to amend the Management Plan so as to allow for greater flexibility in the times and areas in which Tribal members are permitted to hunt while still providing a high margin of safety for the conservation of the gray whale and public safety;

NOW THEREFORE BE IT RESOLVED that Makah Gray Whale Management Plan for 1998-2002 is hereby amended as set forth in the Makah Gray Whale Management Plan for 1998-2002 As Amended April 2001 attached hereto.

MAKAH TRIBAL COUNCIL

By: Greig N. Arnold

Greig Arnold
Chairman

CERTIFICATION

The foregoing Resolution was adopted at a regular meeting; held on 5-30-01 at which a quorum was present, and the Resolution was adopted by a vote of 3 FOR and 0 AGAINST, the Chairman or the Vice Chairman in his absence, being authorized to sign the Resolution.

By: [signature]
Tribal Secretary

MANAGEMENT PLAN FOK MAKAH TREATY GRAY WHALE - HUNTING FOR THE YEARS 1998-2002 AS AMENDED APRIL 2001

I. Introduction.

The purpose of this plan is to set forth the Makah Tribe's management intent and applicable Tribal regulations to govern the exercise of treaty ceremonial and subsistence whaling rights during the period 1998 through 2002. This management plan is adopted pursuant to Article 4 of the Treaty of Neah Bay, and the International Convention for the Regulation of Whaling ("ICRW") Schedui: Amendment adopted by the International Whaling Commission ("IWC") on October 23, 1997, Under the ICRW Schedule Amendment, the Makah. Tribe is authorized to share a five year aboriginal subsistence quota of 620 gray whales with the indigenous people of Chukotka, Russia.

The IWC was informed that under an Agreement between NOAA and the Council, the Makah gray whale harvest would not exceed 5 1 anded whales per year. The management plan contains a number of additional management measures adopted voluntarily by the Tribe to ensure the orderly development of safe, humane, and culturally appropriate whale hunts. In accordance with the ICRW Schedule Amendment, the management plan strictly prohibits commercial sale of whale products except for traditional handicrafts (including artwork) made from non-edible parts of the whale. No international trade is permitted.

It is the Tribe's intent to provide for the gradual development of ceremonial and subsistence whale hunts over the five-year period so as to allow for the development of Tribal management capabilities, refinement of hunting methods, and assessment of the Tribe's cultural and subsistence needs. The Tribe intends to utilize the experience and information collected during the five year term of this plan to develop a second multi-year plan, pending IWC review of the current ICRW Schedule. The conservative management approach provided for in this management plan is not intended to limit, waive or modify any of the Tribe's whaling rights under the Treaty of Neah Bay and any such construction of this plan is improper and unauthorized.

II. Definitions.

A. "Calf" means any whale less than 1 year old or having milk in its stomach.

B. "Council" means the Makah Tribal Council.

C. "Commission" means the Makah Whaling Commission.

D. "Landing" means bringing a whale or any parts of a whale onto land in the course of whaling operations.

E. "Member" means an enrolled member of the Makah Indian Tribe.

F. "Natural Resources Department" or "NRD" means the Makah Natural Resource Department.

G. "Strike" means any blow or blows delivered to a whale by a harpoon, lance, rifle, explosive device or other weapon., When used as a verb, "strike" means the act of delivering such a blow or blows to a whale. A harpoon blow is a strike only if the harpoon is embedded in the whale. Any rifle shot which hits a whale is a strike, For purposes of Parts III.C and III.F, multiple strikes on a single whale shall count as a single strike.

H. "Take" means to flag, buoy or make fast to a whale catcher, including a canoe, chase boat or support boat.

I. "Tribe" means and "tribal" refers to the Makah Indian Tribe.

J. "Whale products" means any unprocessed part of a whale and blubber, meat, bones, whale oil, meal and baleen.

K. "Whaling" means the scouting for, hunting, striking, killing, or landing of a whale.

L. "Whaling captain" means the member in charge of a whaling team who holds a whaling permit issued by the Commission and approved by the

Council under this management plan.

M. "'Whaling expedition" means a complete voyage in which a whaling team leaves port or shore for the purpose of whaling and returns to port or shore.

N. "Whaling team" means a group of members under the control of a whaling captain who holds a whaling permit issued by the Commission and approved by the Council under this management plan.

III. Harvest **Quotas/Strike** Limits.

A. The total number of gray whales taken by members in any one calendar year shall not exceed five (5).

B. The total number of gray whales taken by members between 1998 and 2002 shall not exceed twenty (20).

C. The total number of gray whales struck by members between 1998 and 2002 shall not exceed thirty-three (33), provided that the Commission and the Council will take prudent management measures to reduce the ratio of struck whales to landed whales in any one calendar year to no more than 2:1. The total number of gray whales struck by members between 2001 and 2002 shall not exceed fourteen (14).

D. No member may strike a gray whale calf or a female gray whale accompanied by a cal for calves.

E. No member may strike a whale other than a gray whale.

F. The total number of gray whales struck by members between 2001 and 2002 in the Strait of Juan de Fuca east of the Tatoosh-Bonilla line or between June 1 and November 30 in the Pacific Ocean west of the Tatoosh-Bonilla line shall not exceed five (5).

IV. Permits.

A. No member may engage in whaling except under the control of a whaling captain who is in possession of a valid whaling permit issued by the Commission and approved by the Council. All whaling permits issued by the Commission and approved by the Council shall incorporate all of the requirements of this management plan and any additional requirements the Commission and Council deem appropriate. Upon reaching the strike limit in Part III.F above. whaling permits shall be issued with the intem of targeting migrating, whales.

B. Any whaling permit issued by the Commission and approved by the Council shall be issued only to a whaling captain certified by the Commission pursuant to Part V below. The permit shall identify the vessels which will participate in the hunt, the members who will be part of the caplain's whaling team, and the boundaries of the designated area in which hunting will be permitted.

C. The Commission shall not issue and the Council shall not approve a whaling permit without determining that the whaling captain and each whaling team member has been certified by the Commission as qualified to perform his assigned role on the whaling, team.

D. The Council shall provide at least 24 hours advance notice to the National Marine Fisheries Service ("NMFS") and the United States Coast Guard ("USCG") prior to approving a whaling permit. The advance notice requirement shall not apply if a NMFS observer is already present on the Makah Reservation. The whaling captain shall coordinate with the on-site NMFS observer and the Coast Guard prior to departing on a whaling expedition.

E. A whaling permit shall terminate when any one of the following events occurs: (1) the whaling team lands a gray whale; (2) the whaling team. strikes a gray whale but is unable to land it; (3) the whaling team has not struck or landed a whale within 1.0 days of permit approval; or (4) the Commission or the Council determine, for any reason, to terminate the permit.

F. The Commission may issue a whaling permit cnly after determining that there is an unmet traditional subsistence or c ıltural need for whale products in the tribal community.

V. Training/Qualifications.

The Commission shall establish certification guidelir es and a certification process for whal ing captains, harpooners, riflemen, dive 's, canoe paddlers, and other whaling teammembers. The certification guidelines and the certification process shall ensure that every whaling captain and eaťh member who serves on a whaling team has received adequate training to perform his assigned role on the team. Certification of riflemen shall include a demonstration of proficiency and accuracy under simulated hunting con litions.

VI. Whaling Vesselis, Equipment and Hunting Method:,.

A. A whaling team must include one or more canoes,. one or more chase boats, and one or more support boats.

B. All canoes used in whaling must be at least 3 0 fe t in length and manned by a harpooner and at least six paddlers.

C. All. chase boats used in whaling must be at least 18 feet in length and powered by an, engine large enough to tow an adult gray whale: to port, Each chase boat shall be manned by a pilot, diver, rifleman, and harpooner. The diver or an additional crew mem ber shall act as a safety officer. One boat shall be equipped with a navig ation system capable of precisely fixing the vessel's position on the water.

D. All whaling harpoons must be equipped with a :oggle point, connected to one or more floats, and bear a permanent disti active mark identifying the whaling captain who is in charge of the v/haling team using the harpoon.'

E. The rifle used in gray whale hunts shall be ran adequate very high-powered rifle (.458 caliber or higher), approved by the Commission far use in whaling.

F. The first strike made upon a gray whale shal I be r nade by the harpooner on a canoe and shall affix one or more floats to the whale. The chase boat will pursue the whale and the rifleman abo rd the chase boat will kill the whale as expeditiously as practicable with rifle shots directed at the whale's brain and upper spinal cord.

G. The rifleman on the chase boat shall not disch rge his weapon until authorized to fire by the safety officer. The safety offices will not authorize the discharge of the rife unless: (1) the barrel of the rifle is above and within 30 feet or less from the target area of the whale; and (2) the safety officer determines that the riflemar's field of view is clear of all persons, vessels, buildings:, vehicles, highways and other objects or structures that if hit by a rifle shot could cause injury to human life or property.

H. The whaling captain will suspend the hunt, if the safety officer determines that visibility is less than 500 yards in any direction.

I. Upon the death of a whale, the chase boat crew will secure the whale for towing to shore. The whale will be expeditiously towed to shore by a chase or support boats.

J. By following the general procedures set out herein, whaling teams shall make best efforts to land every whale that is struck and shall ensure that the hunt does not pose a risk to human life and property.

K. The Commission shall conduct research and development to further refine the hunting methods set out in this management plan. Upon consultation with the Commission and the National Marine Fisheries Service, the Council may periodically amend the provisions of this part to improve the safety, effectiveness and humaneness of gray whale hunts.

'VII, Area **Restrictions.**

A. All whaling shall occur within the adjudicated usual and accustomed grounds of the Makah Tribe.

B. Within the area open to whaling under paragraph A above, whaling may be confined to an area designated by the Commission and the Council in each whaling permit.

C. The initial strike of a whale shall not occur within 200 yards of Tatoosh Island or White Rock between May and September.

D. A whale shall not be struck within the "closed area" designated in Section 10.5.02 of the Makah Law and Order Code (Weapons Control Ordinance No, 43 enacted 9/5/89) or east of the "closed area" to a line extending from the southern end of Waadah Island to Baada Point

E. Whaling may occur only within the Regulated Navigation Area (RNA) established by the United States Coast Guard as amended.

VIII. Use of Meat **and** Whale Products.

A. Whale products taken pursuant to this management plan shall be used exclusively for local consumption and ceremonial purposes and may not be sold or offered for sale. No member may receive money for participation in whaling.

B. Notwithstanding paragraph A above, traditional handicrafts (including artwork) made from non-edible whale product,: may be sold or offered for sale within the United States. A member may not engage in international trade of these handicrafts.

C. The Commission shall periodically monitor the utilization of whale products within whaling families and the tribal community to determine when an unmet need for whale meat or other products exists The Commission may conduct research. in order to accurately and systematically estimate the 'Tribe's traditional subsistence and cultural needs.

IX. Monitoring and Reporting.

A. A Makah Natural Resources Department ("NRD") representative will accompany each whaling team as an observer. Upon request of NMFS, the NRD representative will permit an additional observer from the Northwest Region of the National Marine Fisheries Service to observe the hunt.

B. The NRD observer shall. be responsible for recording the time, date and precise location of each whale struck. For each whale struck, the NRD observer shall record whether the whale is landed. If the whale is not landed, the NRD observer shall describe the circumstances associated with the striking of the whale and estimate whether the animal suffered a wound that might be fatal.

C. For each whale landed, the NRD observer shall record the body length (as measured from the point of the upper jaw to the notch between the tail flukes), the extreme width of the flukes, and the sex of the whale. The NRD observer shall also record the length and sex of any fetus in the landed whale.

D. The NRD observer shall record the time interval between the initial strike and the death of the whale.

E. The NRD shall be responsible for compiling and transmitting the weekly and annual reports required under the Agreement between the Council and NOAA. During periods in which whaling permits have been issued, the NRD will provide the National Marine Fisheries Service with a weekly oral report regarding the number of whales struck and landed. To the extent specified in any bilateral agreement, the NRD will also provide periodic oral or written reports regarding the number of whales struck and landed to representatives of the Russian 'Federation,

F. By January 30 of each year, the NRD and the National Marine Fisheries Service will prepare a joint written report compiling all of the data. accorded by the NRD under paragraphs B through D above, as well as any additional data recorded by National Marine Fisheries Service personnel.:

G. The NRD will assist National Marine Fisheries Service personnel in the collection of specimen material from landed whales, including but not limited to, ovaries, ear plugs, baleen plates, stomach contents, and tissue samples. The NRD may collect additional samples for its own use as part of the Tribe's research and management activities.

X. Enforcement.

A. The Natural Resources Enforcement Division shall be the Tribal law enforcement agency responsible for enforcing the requirements of whaling permits and this management plan.

B. Any member found whaling in violation of this management plan or the terms of a whaling permit issued by the Commission and approved by the Council. shall be subject to prosecution in Tribal Court for a Class AA criminal offense in accordance with the procedures set forth in Title 2 of the Makah Law and Order Code.

C. A whaling captain shall be deemed liable for any violations of a whaling permit or this management plan committed by a member of a whaling team under his control.

XI. Penalties.

A. Any member convicted by the Tribal Court of the offense of whaling in violation of this management plan or the terms of any whaling permit issued by the Council shall be subject to the penalties for a Class AA criminal offense under Section 5.8.01 of the Makah Law and Order

Code?

B. Members convicted of said offense may also be barred from exercising treaty fishing, hunting and/or whaling rights for up to three (3) years.

C. In determining the severity of punishment, the Court shall consult with the Commission and take into account the seriousness of the injury to the Tribe and Tribal resources.

XII. Amendments.

The Council may amend this management plan from time to time in consultation with the Commission and NOAA as new information becomes available, provided that the requirements of the management plan shall comply with the ICRW Schedule Amendment, any cooperative agreement between NOAA and the Council, and all applicable federal law.

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[1] Section 5.8.01 of the Makah Law and Order Code currently provides that Class AA offenses are punishable by a fine not to exceed $5000 and imprisonment not to exceed 12 months.

Appendix B
Makah Tribe's 2013 Whaling Ordinance

RESOLUTION NO.: 118-13
DATE ENACTED: 8-13-2013
SUBJECT MATTER: Makah Whaling Ordinance

RESOLUTION NO. 118-13 OF THE MAKAH TRIBAL COUNCIL

WHEREAS, the Makah Tribal Council is the governing body of the Makah Indian Tribe under the Tribe's Constitution and Bylaws approved on May 16, 1936, by the Secretary of the Interior; and

WHEREAS, the Makah Tribe has a documented whaling tradition and has depended on whaling as the basis of its economy, subsistence, and culture for at least 1,500 years; and

WHEREAS, the Treaty of Neah Bay secures in perpetuity the Tribe's right of taking fish and whaling and sealing at all usual and accustomed grounds and stations;

WHEREAS, the Tribal Council is authorized under Article VI, § 1(i) of the Tribe's Constitution to promulgate and enforce ordinances governing the conduct of members of the Tribe, and under Article VI, § 1(j) to safeguard and promote the health, safety and general welfare of the Tribe; and

WHEREAS, the Tribal Council recognizes the paramount importance of whaling to the Makah Tribe and the central role that effective management of whales and regulation of whaling must play in the Tribe's exercise of its treaty whaling right; and

WHEREAS, the Makah Tribe previously managed and regulated whaling under a management plan adopted on January 30, 1998 by Resolution No. 67-98; and

WHEREAS, the Tribal Council finds that it is necessary to adopt the Makah Whaling Ordinance to implement the Makah Tribe's management, regulation and enforcement of the Tribe's treaty whaling right.

NOW THEREFORE BE IT RESOLVED, that the Makah Tribal Council hereby adopts the Makah Whaling Ordinance, a copy of which is attached to this Resolution. The Ordinance so adopted shall supersede all prior Makah whaling management plans and amendments thereto and whaling regulations upon approval by the Secretary of the Interior.

MAKAH TRIBAL COUNCIL

Timothy J. Greene, Sr.

Timothy J. Greene, Sr.
Chairman

CERTIFICATION

The foregoing Resolution was adopted at a regular meeting held on Aug 13, 2013, at which a quorum was present, and the Resolution was adopted by a vote of 4 FOR and 0 AGAINST, the Chairperson, or the Vice-Chairperson in his absence, being authorized to sign the Resolution.

By: JoDean Haupt-Richards

JoDean Haupt-Richards
Tribal Secretary

APPROVED BY: ______________________________
Stanley Speaks, Regional Director
Bureau of Indian Affairs – Northwest Regional Office

DATE:______________________

MAKAH WHALING ORDINANCE

Introduction and Declaration of Policy

The Makah Tribe has a tradition of hunting whales off the northwestern tip of the Olympic Peninsula that has endured for at least 1,500 years. Whaling was, and continues to be, central to the Tribe's way of life, providing a primary means of subsistence as well as essential spiritual, social and cultural functions. The need to continue whaling was so important to the Tribe that when it negotiated the 1855 Treaty of Neah Bay with the United States, it reserved the right of whaling, making it the only tribe with whaling rights expressly protected by federal law. In the early twentieth century, Makah whaling declined because of the overexploitation of Pacific Ocean whale stocks by non-Indian commercial whaling operations. In contrast with this depletion by Yankee whalers, the Makah Tribe has always sought to live in harmony with the abundant resources of its marine environment. It is the purpose of the Tribe in adopting this Ordinance to control and manage all whaling by Tribal members in order to achieve sustainable utilization and conservation of whales, implement the whaling rights reserved by the Treaty of Neah Bay and preserve the treaty right for future generations of Makahs.

This Ordinance sets forth the Makah Tribe's management intent and applicable Tribal law governing the exercise of treaty ceremonial and subsistence whaling rights. The Makah Tribal Council enacts the Makah Whaling Ordinance pursuant to the inherent authority of the Council to manage Tribal members' exercise of the Tribe's treaty whaling rights and the authority vested in it by Article VI, Sections 1(i) and 1(j) of the Makah Constitution and Bylaws.

The Council's intent under this Ordinance is to authorize the hunting of only gray whales pursuant to the International Whaling Commission (IWC) aboriginal subsistence whaling catch limit and federal regulations promulgated pursuant to the Tribe's pending application for a waiver of the Marine Mammal Protection Act's take moratorium. The Council will amend this Ordinance to authorize the hunting of other species of whales only if approval for such whaling is obtained under international and federal law.

The Makah Whaling Ordinance contains general provisions for the exercise of whaling rights and provides for Council adoption of regulations regarding harvest quotas, strike limits and time and area restrictions and for Council issuance of whaling permits which may contain additional limitations. The Ordinance also contains a number of management measures to ensure the orderly development of safe, efficient, humane, and culturally appropriate whale hunts. The Ordinance strictly prohibits commercial sale of whale products except for sale within the United States of traditional handicrafts (including artwork) made from non-edible parts of the whale. The Ordinance contains provisions relating to the use of stranded whales.

The Ordinance also specifies penalties for violations of its provisions, Makah whaling regulations and whaling permits. Because the treaty whaling right is fundamental to the Tribe, the Council intends for the Ordinance and the regulations and permits issued under it to be applied strictly and for violations to be prosecuted to the full extent of Tribal law. The whaling right is central to the subsistence needs, culture and identity of the Makah Nation and belongs to present and future generations of Makahs. Any action by an individual that jeopardizes the Tribe's whaling right shall be subject to serious consequences.

The management of treaty ceremonial and subsistence whaling provided for in the Makah Whaling Ordinance and any regulations adopted or permits issued by the Council shall not limit, waive or modify any of the Tribe's whaling rights under the Treaty of Neah Bay and any such construction of this Ordinance, Makah whaling regulations or whaling permits is improper and unauthorized.

Chapter 1. General Provisions

1.010 Title.

This Ordinance shall be known as the "Makah Whaling Ordinance."

1.020 Prior Tribal Whaling Laws Superseded.

This Ordinance supersedes all prior Makah whaling management plans and whaling regulations.

1.030 Treaty Whaling Rights – Authority of the Makah Tribal Council.

The whaling rights reserved expressly to the Makah Tribe in the Treaty of Neah Bay are reserved to the Makah Tribe as a whole. The exercise of these treaty reserved whaling rights by a Tribal member is a privilege extended to that member by the Makah Tribe through its representative and governing body, the Makah Tribal Council.

1.040 Jurisdiction.

(a) Territory.

The provisions of this Ordinance and all regulations adopted under it shall apply to the full extent of the sovereign jurisdiction of the Makah Tribe, including but not limited to the Makah Reservation and the Makah Tribe's usual and accustomed whaling places as provided in the Treaty of Neah Bay.

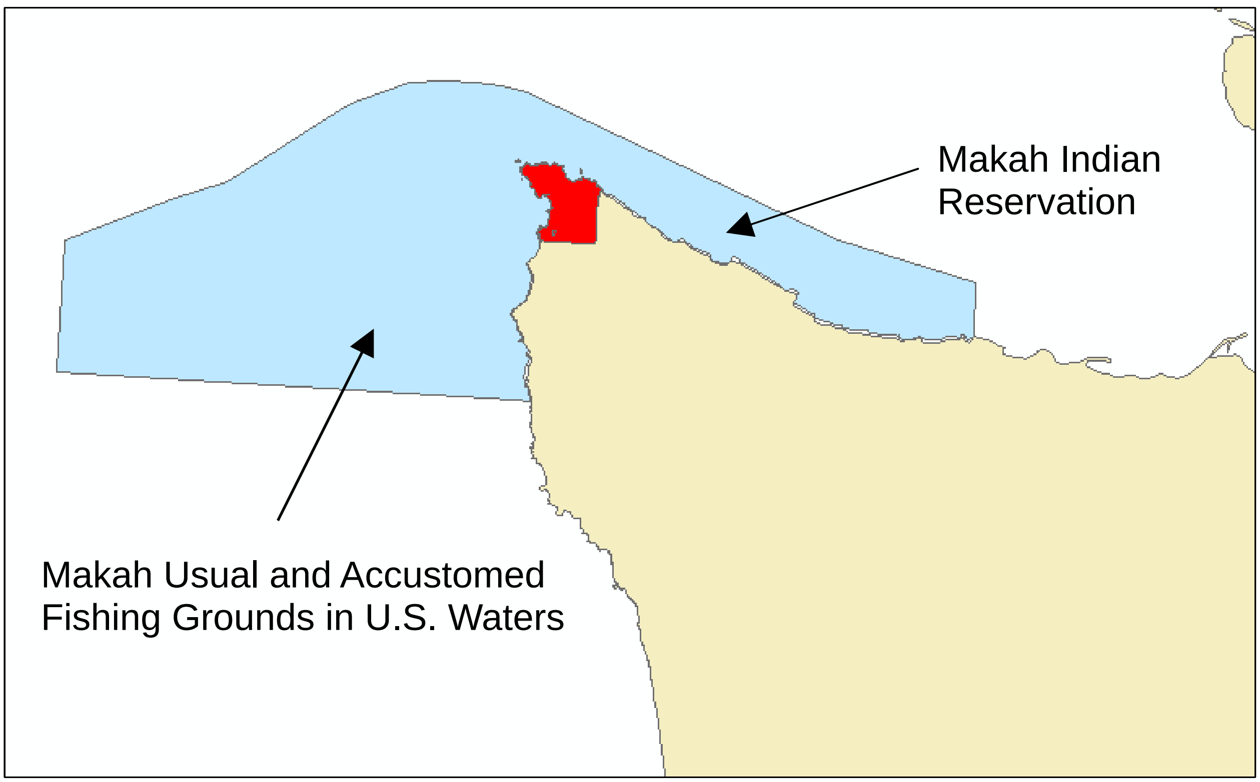

Figure 1: The Makah Tribe's adjudicated Usual and Accustomed Fishing Grounds in U.S. Waters.

(b) Persons.

The provisions of this Ordinance shall extend to all Tribal members who are exercising or purporting to exercise treaty whaling rights of the Makah Tribe while engaged in whaling, traveling to or from off-reservation areas on a whaling expedition, or any other activity regulated by this Ordinance.

1.050 General Closure.

All areas within the Tribe's jurisdiction are closed to whaling unless those areas are specifically opened by regulation. All times of the year are closed to whaling unless they are specifically opened by regulation. Areas and times opened by regulation are only opened to whaling in accordance with this Ordinance and all applicable regulations and permits.

Chapter 2. Definitions

2.010 Definitions.

The following terms have the meanings set forth below when they appear in this Ordinance, Makah whaling regulations and whaling permits, unless explicitly stated otherwise:

(a) "Calf" means any whale less than 1 year old.

(b) "Council" means the Makah Tribal Council.

(c) "Commission" means the Makah Whaling Commission.

(d) "Edible whale product" means whale meat or blubber. Edible whale products do not include whale products that are diseased, contaminated, or damaged in the course of the hunt.

(e) "Handicraft" is a term used in the Marine Mammal Protection Act and is not intended to denigrate the quality of work of Makah artists. As used in this Ordinance, the term "handicraft" means artwork and other items which are composed wholly or in significant part of non-edible whale products from a gray whale harvested under this Ordinance and Makah whaling regulations or from a stranded gray whale, and which are individually produced, decorated or fashioned by a member.

(f) "Land" or "Landing," when used as a verb, means bringing a whale or any part of a whale onto land in the course of a whaling expedition.

(g) "Makah Fisheries" means the Makah Fisheries Management Department.

(h) "Member" means an enrolled member of the Makah Indian Tribe.

(i) "Non-edible whale product" means any whale product that is not an edible whale product.

(j) "Regulation" means any rule or regulation adopted by the Makah Tribal Council pursuant to this Ordinance.

(k) "Revocation of Whaling Privileges" means the loss of all rights and privileges to whale under this Ordinance and Makah whaling regulations until such time, if any, as whaling privileges are restored.

(l) "Stranded" means a whale that dies of causes other than a Tribal hunt or becomes live stranded and is floating or beach cast.

(m) "Strike" means any blow or blows delivered to a whale by a harpoon, lance, rifle, explosive device or other weapon which may result in death to a whale. When used as a verb, "Strike" means the act of delivering such a blow or blows to a whale. A harpoon blow is a strike if the harpoon penetrates and lodges in the whale. A harpoon that lodges in the whale counts as a strike even if the harpoon later pulls out of the whale. Any rifle shot which hits a whale is a strike. For purposes of determining strike limits, multiple strikes on a single whale shall count as a single strike.

(n) "Suspension of Whaling Privileges" means the loss of all rights and privileges to whale under this Ordinance and Makah whaling regulations for a period of time specified by this Ordinance, the Court or the Council.

(o) "Tribe" means and "Tribal" refers to the Makah Indian Tribe.

(p) "Tribal Court" or "Court" means the Makah Tribal Court.

(q) "Waste" means the taking of a whale subject to regulation under this Ordinance and Makah whaling regulations and allowing edible whale products to spoil or otherwise become unfit for human consumption or medicinal or spiritual use.

(r) "Wasteful manner" means a method of whaling that is not likely to result in the landing of a struck whale or that does not include all reasonable efforts to retrieve a struck whale.

(s) "Whale product" means any part of a whale, including blubber, meat, bones, whale oil, meal and baleen. The definition of whale products excludes handicrafts that are made from non-edible whale products.

(t) "Whale" in its verb form, and such derivatives as "whaling," means the scouting for, hunting, striking, killing, or landing of a whale.

(u) "Whaling captain" means the member in charge of a whaling team who holds a whaling permit issued by the Council under this Ordinance and Makah whaling regulations.

(v) "Whaling expedition" means a voyage in which a whaling team leaves port or shore for the purpose of whaling and returns to port or shore.

(w) "Whaling team" means a group of members under the control of a whaling captain who holds a whaling permit issued by the Council under this Ordinance and Makah whaling regulations.

Chapter 3. Whaling Administration

3.010 <u>Makah Tribal Council as Administrator; Delegation of Authority</u>.

The exercise of treaty whaling rights pursuant to this Ordinance shall be subject to the exclusive management and administration of the Makah Tribal Council, with the advice of Makah Fisheries and the Makah Whaling Commission as sought by the Council or otherwise provided for by this Ordinance. The Council may delegate all or part of its authority to manage and administer tribal whaling to Makah Fisheries and/or the Commission, provided that any action taken pursuant to such delegation of authority shall be subject to final approval by the Council and provided further that such delegation may be revoked, modified or withdrawn at any time by the Council.

3.020 Regulations.

Prior to each whaling season and at such other times as it may find appropriate, the Council shall by a duly-enacted resolution adopt regulations as are necessary to implement the policy of the Tribe with respect to whaling, this Ordinance, and any cooperative agreement with the National Oceanic and Atmospheric Administration ("NOAA"). Such regulations shall be consistent with any applicable federal regulations promulgated under the Marine Mammal Protection Act. The regulations adopted pursuant to this provision shall address, but are not limited to, the following:

(a) Annual harvest quotas and strike limits; and

(b) Time and area restrictions.

The Council may impose additional limitations on the exercise of whaling rights through its issuance of whaling permits under Chapter 5, below.

3.030 Notice of Regulations.

Makah whaling regulations shall be adopted, filed and made available to the Commission, National Oceanic and Atmospheric Administration, Coast Guard and Marine Mammal Commission at least thirty (30) days prior to the opening date of the applicable whaling season to ensure adequate notice. All regulations shall be posted in appropriate places, including the Natural Resources Enforcement and Makah Fisheries offices, and otherwise made available to tribal members as specified by general regulations designated to give adequate notice.

3.040 Revocation or Suspension of Whaling Privileges.

In addition to judicially imposed penalties for violations of this Ordinance, Makah whaling regulations or the terms of a whaling permit, any member's whaling privileges may be revoked or suspended by the Council for good cause shown when the Council by duly-enacted resolution determines that such revocation or suspension will be in the best interest of the Tribe. "Good cause" for suspension or revocation shall include, but not be limited to, a conviction for violating this Ordinance, Makah whaling regulations or a whaling permit, conviction of a Class AA or Class A offense under the Makah Law and Order Code, failure to appear in Makah Tribal Court as required for charges or a conviction under this Ordinance, disobeying Court orders including sentencing orders for charges or a conviction under this Ordinance, assault on a Natural Resources Enforcement Officer, other law enforcement officer or other tribal official, reckless disregard for the safety of others when whaling, and any actions that might jeopardize the Tribe's ability or opportunity to responsibly manage its whaling rights or to otherwise accomplish the purposes of this Ordinance. Prior to any such revocation or suspension the Tribal Council shall make necessary arrangements to ensure that the member affected is given adequate notice of the proposed revocation or suspension and an opportunity to be heard before the Council. This Section shall be construed to be in addition to and not in conflict with or in derogation of those sections of this Ordinance dealing with judicial penalties for violations.

Chapter 4. Enforcement

4.010 <u>Natural Resource Enforcement Officers</u>.

It shall be the duty of every tribal Natural Resources Enforcement Officer to enforce this Ordinance, Makah whaling regulations and whaling permits, and to this end all such officers shall be vested with such authority to the full extent of Tribal law. Natural Resources Enforcement Officers may issue citations or make arrests and seizures in accordance with this Ordinance and the Makah Law and Order Code. Officers may use such vessels and/or vehicles as are necessary to perform their duties. The Tribal Council may also, from time to time, appoint and deputize persons to assist Natural Resources Enforcement Officers in the performance of their duties.

4.020 <u>Arrests for Criminal Offenses</u>.

Natural Resources Enforcement Officers shall have the authority to make an arrest of any person whaling under this Ordinance or Makah whaling regulations or issue citations or summons or other appropriate forms to assure appearance in Court whenever such person is in violation of any provision of this Ordinance, Makah whaling regulations or the terms of a whaling permit.

4.030 Searches.

Natural Resources Enforcement Officers may conduct limited searches without warrant. These include inspection and searching of gear and vessels, and patting down the person of a whaler who is of the same sex as the officer.

4.040 Seizure of Whale and Gear.

Upon arrest or the issuance of a citation, a Natural Resources Enforcement Officer may seize the whale and parts of the whale which the officer has reasonable grounds to believe have been taken, killed, possessed or used by the alleged violator contrary to the provisions of this Ordinance, Makah whaling regulations or a whaling permit. In lieu of seizing the whale, the officer may direct the whaling captain to tow the whale to land. A Natural Resources Enforcement Officer may, in addition, seize any weapons, vessels or other paraphernalia which the officer has reasonable grounds to believe have been used in the commission of a violation of this Ordinance, Makah whaling regulations or a whaling permit. The Natural Resources Enforcement Officer shall prepare an inventory of all items seized, which shall be signed by the officer and, if known, the owner or possessor. A copy of the inventory shall be given to the owner or possessor, if known, and to the Commission. If the owner or possessor is not known, a reasonable attempt shall be made to locate him or her to provide a copy of the inventory.

4.050 Disposition of Seized Whale Products and Handicrafts.

If whale products or handicrafts are seized from a whaling captain, whaling team member or other tribal member, the Natural Resources Enforcement office shall dispose of the property in a manner consistent with applicable Tribal and federal law. The Natural Resources Enforcement office shall consult with the Council, Makah Fisheries and the National Oceanic and Atmospheric Administration prior to making a decision regarding the disposition of any seized whale products or handicrafts.

4.060 Disposition of Other Seized Property.

This section applies only to seized property other than whale products or handicrafts. After: (1) final disposition of any charges arising from the events which led to the seizure of property under Section 4.040 above; (2) satisfactory proof of ownership or rightful possession; and (3) payment of reasonable costs for retrieval and storage, the Natural Resources Enforcement office may release such seized property (except contraband) to the owner or rightful possessor. Any person claiming ownership of rightful possession of seized property who is unable to obtain its release from the Natural Resources Enforcement office may petition the Tribal Court for an order releasing the property. The Court shall order the release of seized property only in conformance with this Section, provided that the Court may order the release of such property prior to final disposition of the charges if the Court finds: (1) it would cause undue hardship not to release the property; (2) the property is not needed for evidence; and (3) the Court has received satisfactory assurances that the property will not be used in violation of this Ordinance, Makah whaling regulations, or any other Tribal law. In circumstances where the owner or rightful possessor of seized property is unknown, and the property is neither contraband nor necessary evidence, the Natural Resources Enforcement office shall post a notice at the tribal Natural Resources Enforcement office and other appropriate places to ensure adequate notice to members which describes the items seized, the location, date and time of seizure, and states that the items shall be forfeited to the Tribe unless claimed by the owner or rightful possessor within thirty (30) days of the date the notice is posted. The notice shall state the date and time by when, and location where, the property must be claimed, as well as the amount of any retrieval or storage costs that must be paid.

Chapter 5. Permits

5.010 Issuance; Possession by Whaling Captain.

No member may engage in whaling except under the control of a whaling captain who is in possession of a whaling permit issued by the Council. To be valid, a whaling permit must be in writing, approved by a majority of the Council, and signed by the Chairman of the Tribal

Council or his designee. All whaling permits issued by the Council shall incorporate all applicable requirements of this Ordinance and Makah whaling regulations. The Council may also include in all whaling permits any additional requirements the Council deems appropriate.

5.020 Contents of Permit.

Any whaling permit approved by the Council shall be issued only to a whaling captain certified by Makah Fisheries or the Commission, as designated by the Council pursuant to Chapter 6 below. The permit shall identify the date the permit is approved by the Council, the vessels that will participate in the hunt, the members and any alternates who will be part of the captain's whaling team, and the boundaries of the designated area in which hunting will be permitted.

5.030 Certification of Whaling Captain and Whaling Team Prior to Issuance.

The Council shall not approve a whaling permit without determining that the whaling captain, each whaling team member and any alternates identified in the permit have been certified by Makah Fisheries or the Commission, as designated by the Council pursuant to Chapter 6 below.

5.040 Notice to Federal Government.

The Council shall provide at least 24 hours advance notice to the National Marine Fisheries Service ("NMFS") and the United States Coast Guard ("USCG") prior to approving a whaling permit, provided that, if a NMFS observer is already present on the Makah Reservation, the Council shall provide at least 3 hours advance notice to NMFS and the USCG prior to approving a whaling permit.

5.050 Coordination with NMFS Observer and Coast Guard.

The whaling captain shall coordinate with any on-site NMFS observer, the Coast Guard and the Tribal observer prior to departing on a whaling expedition.

5.060 Termination.

A whaling permit shall terminate and become invalid when any one of the following events occurs: (1) the whaling team lands a whale; (2) the whaling team strikes a whale but is unable to land it; (3) the whaling team has not struck or landed a whale within 10 days of the Council's approval of the permit; (4) the applicable whaling season ends; or (5) the Council determines, for any reason, to terminate the permit.

5.070 <u>Determination of Need</u>.

The Council will issue a whaling permit only after determining, based on the advice of the Commission, that there is an unmet traditional, subsistence or cultural need for whale products in the Tribal community.

Chapter 6. Training/Qualifications

6.010 <u>Certification of Whaling Captain and Whaling Team</u>.

The Council shall establish, with the advice of the Commission, certification guidelines and a certification process for whaling captains, harpooners, riflemen, safety officers, other whaling team members and any alternates. Makah Fisheries or the Commission, as designated by the Council, shall implement the certification guidelines and the certification process. The certification guidelines and the certification process shall ensure that every whaling captain and each member who serves on a whaling team has received adequate training to perform his assigned role on the team. Certification of riflemen and harpooners shall include a demonstration of proficiency and accuracy under simulated hunting conditions. Certification of safety officers shall include a demonstration of proficiency under simulated hunting conditions.

Chapter 7. Whaling Vessels, Equipment and Hunting Methods

7.010 <u>Vessels</u>.

A whaling team must include one or more canoes, one or more chase boats, and one or more support boats.

7.020 <u>Whaling Canoe</u>.

All canoes used in whaling must be at least 30 feet in length and manned by a harpooner and at least six paddlers.

7.030 Chase Boat.

All chase boats used in whaling must be at least 18 feet in length. Each chase boat shall be manned by a pilot, rifleman, and harpooner. At least one chase boat shall be manned by a diver. The diver or an additional whaling team member shall act as a safety officer. One boat shall be equipped with a navigation system capable of precisely fixing the vessel's position on the water. If the chase boat is not powered by an engine large enough to tow an adult whale to port, it must be accompanied by at least one support boat with this capability.

7.040 Harpoons.

All whaling harpoons must be connected to one or more floats and bear a permanent distinctive mark identifying the whaling captain who is in charge of the whaling team using the harpoon. The whaling harpoon used for the initial strike must be equipped with a toggle point.

7.050 Rifle.

The rifle used in whale hunts shall be an adequate very high-powered rifle (.50 caliber or higher), approved by the Council, with the advice of the Commission, for use in whaling. The whaling team shall have at least two rifles available and sufficient ammunition to dispatch a whale.

7.060 Striking the Whale.

The first strike made upon a whale shall be made by the harpooner and shall affix one or more floats to the whale. The chase boat will pursue the whale, and the rifleman aboard the chase boat will kill the whale as expeditiously as practicable with rifle shots directed at the whale's brain stem and upper spinal cord.

7.070 Prohibition on Striking Whale Calf or Whale Accompanied by a Calf.

No member may strike a whale calf or a whale accompanied by a calf or calves.

7.080 Prohibition on Striking Whales Other Than Gray Whales.

No member may strike a whale that is not a gray whale (*Eschrictius robustus*).

7.090 Discharging the Rifle; Role of Safety Officer.

The rifleman on the chase boat shall not discharge his weapon until authorized to fire by the safety officer. The safety officer will not authorize the discharge of the rifle unless it is safe to do so.

7.100 Visibility – Suspension of Hunt.

The whaling captain shall suspend the hunt, if the safety officer determines that visibility is inadequate to ensure a safe hunt.

7.110 Towing the Whale.

Upon the death of a whale, the chase boat crew shall secure the whale for towing to shore. The whale will be expeditiously towed to shore by chase and/or support boats.

7.120 Best Efforts to Land Whales; Prohibition on Whaling in a Wasteful Manner.

A whaling captain shall make best efforts to land every whale that is struck, while minimizing risk to human life and property. It is a violation of this Ordinance for a whaling captain and whaling team to conduct a hunt in a wasteful manner.

Chapter 8. Area Restrictions

8.010 Usual and Accustomed Grounds – Pacific Ocean Waters.

All whaling shall occur within the portion of the Makah Tribe's adjudicated usual and accustomed fishing grounds in U.S. waters to the west of a line connecting the following points: the northwestern tip of Cape Flattery; the Tatoosh Island Lighthouse; the buoy adjacent to

Duntze Rock; and Bonilla Point on Vancouver Island, provided that a whale struck inside the area specified by this Section and a permit may be pursued to an area that is otherwise closed to whaling.

8.020 Area Restricted by Permit.

Within the area open to whaling under Section 8.010 above, whaling may be confined to an area designated by the Council in each whaling permit.

8.030 Closed Area under Weapons Control Ordinance.

A whale shall not be struck within the "closed area" designated in Section 10.5.02 of the Makah Law and Order Code (Weapons Control Ordinance No. 43 enacted 9/5/89) or east of the "closed area" to a line extending from the southern end of Waadah Island to Baada Point.

Chapter 9. Use of Meat, Whale Products and Handicrafts

9.010 Local Consumption.

Whale products harvested pursuant to this Ordinance and Makah whaling regulations or collected from a stranded gray whale shall be used exclusively for local consumption and/or ceremonial purposes and may not be sold or offered for sale. No member may receive money for participation in whaling.

9.020 Handicrafts - Sale.

Notwithstanding Section 9.010 above, handicrafts made from non-edible whale products may be sold or offered for sale only within the United States and in accordance with the requirements of this Ordinance and all federal regulations.

9.030 Handicrafts – Marking and Registration.

The Tribe shall develop and implement a registration system to ensure the authenticity of Makah whale handicrafts. Prior to any sale pursuant to Section 9.020 above, all Makah whale handicrafts must be marked and entered in the Tribe's official registry of whale handicrafts. All handicrafts must bear a distinctive marking approved by the Council. For the official registry, the Tribe will collect and maintain records regarding the following information for each handicraft: (a) artist(s); (b) whale product(s) used; (c) a brief description, including subject matter and approximate size; and (d) registration number. The Tribe shall issue a certificate for each handicraft that must accompany any sale pursuant to Section 9.020. The official registry may be inspected upon request by NOAA.

9.040 Prohibition on Wasting.

A whaling captain and whaling team shall not, upon landing a whale, cause it to go to waste.

9.050 Stranded Whales.

Members may collect whale products from stranded gray whales in the Makah usual and accustomed fishing grounds in U.S. waters for subsistence and ceremonial use and for making handicrafts, but such collection may not occur until Makah Fisheries has had the opportunity to examine the carcass and take samples and has confirmed that the whale is a gray whale and that it did not die from a Tribal hunt. Makah Fisheries will provide timely notice to the National Marine Fisheries Service of all known whale strandings in areas within the Tribe's jurisdiction.

Chapter 10. Monitoring and Reporting

10.010 Whaling Observers.

A representative of Makah Fisheries, or another Tribal department as designated by the Council, will accompany each whaling team as a Tribal observer. Upon request of the National Marine Fisheries Service, the Tribal observer will permit an additional observer from the National Marine Fisheries Service to observe the hunt.

10.020 Responsibility of Tribal Observer – Recording Data from the Hunt.

The Tribal observer shall be responsible for recording:

(a) for each attempted strike,

(1) the time, date and precise location of the attempted strike(s);

(2) whether the whale is landed;

(3) if the whale is not landed, the circumstances associated with the attempted striking of the whale and an estimate of whether the animal suffered a wound that might be fatal;

(b) for each whale landed,

(1) the body length (as measured from the point of the upper jaw to the notch between the tail flukes);

(2) the extreme width of the flukes

(3) the sex of the whale; and

(4) the length and sex of any fetus in the landed whale;

(c) the time interval between the initial strike and the death of the whale; and

(d) such other information as NOAA regulations require.

10.030 <u>Responsibility of Tribal Observer – Reporting</u>.

The Tribal observer shall be responsible for compiling and transmitting such reports as are required under any regulations promulgated under the Marine Mammal Protection Act and any cooperative agreement with the National Oceanic and Atmospheric Administration to the Council.

10.040 <u>Joint Annual Report</u>.

Following a season in which whaling has occurred, Makah Fisheries shall prepare a written report compiling all of the data for the season recorded by the Tribal observer(s) under Sections 10.020 and 10.030 above, as well as any additional data provided by National Marine Fisheries Service personnel, and transmit such report to the Council and the appropriate representative of the National Marine Fisheries Service within thirty (30) days of the last day of the season.

10.050 <u>Collection of Specimen Materials</u>.

Makah Fisheries may collect specimen materials from all landed whales, including but not limited to ovaries, ear plugs, baleen plates, stomach contents, and tissue samples. A representative of the National Marine Fisheries Service shall have reasonable access to all landed whales to collect specimen materials.

10.060 Photography of Landed Whales.
Makah Fisheries shall photograph all landed whales and transmit a copy of such photos to the National Marine Fisheries Service.

10.070 Observer Access.
Makah Fisheries, and the representative of the National Marine Fisheries Service as appropriate, shall have adequate access to landed whales to comply with the requirements of this Chapter. No person shall interfere with the actions necessary to comply with this Chapter.

Chapter 11. Violations

11.010 Responsibility of Whaling Captain and Whaling Team; Strict Construction.
It is the responsibility of every member engaging in whaling to know the contents of this Ordinance, Makah whaling regulations and the permit under which the member is whaling. This Ordinance, Makah whaling regulations and the terms of a whaling permit shall be strictly construed against such persons, taking into account the importance of the Tribe's management of the treaty whaling right and the whaling resource and the purpose and intent of the Council in enacting this Ordinance. Copies of this Ordinance and current Makah whaling regulations shall be available for review in the Makah Fisheries and Natural Resources Enforcement offices. Any member shall have the opportunity to have the Ordinance and regulations read to him or her upon request.

11.020 Criminal Offenses.

(a) Any member who whales without authorization under a valid whaling permit is guilty of a Class AA Offense under the Makah Law and Order Code.

(b) Any member who whales in violation of a time, area or species provision of this Ordinance, Makah whaling regulations, or the terms of a whaling permit is guilty of a Class AA Offense under the Makah Law and Order Code.

(c) Any member who strikes a whale calf or whale accompanied by a calf and who knows or should know that such whale is a calf or whale accompanied by a calf, is guilty of a Class AA Offense under the Makah Law and Order Code.

(d) Any member who violates a provision of this Ordinance, Makah whaling regulations or the terms of a whaling permit that is not specified in Sections 11.020(a) through 11.020(c) is guilty of a Class A Offense under the Makah Law and Order Code.

11.030 Liability of Whaling Captain.

A whaling captain shall be deemed liable if a member of a whaling team identified in a permit issued to the whaling captain, or otherwise under his control, violates a provision of this Ordinance, Makah whaling regulations or the terms of the whaling permit.

Chapter 12. Penalties

12.010 Law and Order Code Penalty.

(a) Any member convicted by the Tribal Court of an offense in Sections 11.020(a) through 11.020(c) shall be sentenced pursuant to the penalties provided for Class AA criminal offenses under Section 5.8.01 of the Makah Law and Order Code.[1]

(b) Any member convicted by the Tribal Court of an offense in Sections 11.020(d) or 11.020(e) shall be sentenced pursuant to the penalties provided for Class A criminal offenses under Section 5.8.02 of the Makah Law and Order Code.[2]

12.020 Suspension of Treaty Privileges.

(a) For any member convicted by the Tribal Court of an offense in Sections 11.020(a) through 11.020(c), the Court shall suspend the member's treaty fishing, hunting and

[1] Section 5.8.01 of the Makah Law and Order Code currently provides that a Class AA offense is punishable by a fine not to exceed $5000 and imprisonment not to exceed 12 months.

[2] Section 5.8.02 of the Makah Law and Order Code currently provides that a Class A offense is punishable by a fine not to exceed $500 and imprisonment not to exceed 6 months.

whaling privileges for a minimum of three (3) years and a maximum of five (5) years. The length of the suspension of treaty privileges is not required to be identical for all treaty privileges. The Court may not impose a suspended sentence for this portion of the penalty.

(b) For any member convicted by the Tribal Court of an offense in Sections 11.020(d) or 11.020(e), the Court may suspend the member's treaty fishing, hunting and whaling privileges for a maximum of five (5) years. The length of the suspension of treaty privileges is not required to be identical for all treaty privileges.

12.030 Commission Disqualification.

(a) Any member convicted by the Tribal Court of an offense in Sections 11.020(a) through 11.020(c) shall be ineligible to hold a position as a member or alternate of the Commission for ten (10) years and shall be permanently ineligible to serve as an officer of the Commission.

(b) Any member convicted by the Tribal Court of an offense in Sections 11.020(d) or 11.020(e) shall be ineligible to hold a position as a member or alternate of the Commission for two (2) years and shall be permanently ineligible to serve as an officer of the Commission.

12.040 Sentencing Considerations.

In determining the sentence, the Court shall take into account the harm caused by the person to the Tribe, the Tribe's treaty right and Tribal resources. The Court may seek written recommendations with respect to these factors from the Council and the Commission.

Chapter 13. Miscellaneous Provisions

13.010 Amendments.

The Council may amend this Ordinance from time to time as new information becomes available from Makah Fisheries, the Commission, the National Oceanic and Atmospheric Administration and other reliable sources, provided that the requirements of the Ordinance shall comply with the applicable International Convention for the Regulation of Whaling ("ICRW")

Schedule Amendment, any cooperative agreement between NOAA and the Council, and all applicable federal and Tribal law.

13.020 Severability.

The provisions of this Ordinance are severable. If any provision of this Ordinance or its application to any person or legal entity or circumstances is held invalid, the reminder of this Ordinance, or the application of the provision to other persons or legal entities or circumstances, shall not be affected.

Appendix C

Responses to Comments on 2012 Notice of Intent To Terminate the Existing Draft Environmental Impact Statement and Prepare a New Environmental Impact Statement

In a Federal Register notice dated May 21, 2012 (77 FR 29967) we announced our decision to terminate the 2008 Draft Environmental Impact Statement (DEIS) and to begin preparation of a new DEIS that is informed by substantial new information (gray whales in particular), proceedings of the International Whaling Commission, and public input.

We received 11 comment letters, postcards, e-mails, and facsimiles during the 2012 scoping period. Some people submitted comments in more than one medium. Identical comments from the same commenter that were submitted in different formats are included only once when describing the number of letters and comments received. The commenters were as follows:

- Animal Welfare Institute, Washington D.C., USA
- Owens, C. (citizen) Washington, USA
- Rorabeck, C. (citizen) Oregon, USA
- California Gray Whale Coalition, California, USA
- The U.S. Environmental Protection Agency, Washington, USA
- Green Vegans, Washington, USA
- The Humane Society of the United States, Washington, D.C., USA
- Public, J. (citizen) New Jersey, USA
- Marine Mammal Commission, Maryland, USA
- Peninsula Citizens for the Protection of Whales, Washington, USA
- Abels, S.R. (citizen) Ohio, USA

The geographic origin of written correspondence could be determined for all of the correspondence received. All of the comments originated from the following 7 U.S. states/districts: California; Maryland, New Jersey; Ohio; Oregon; Washington (state); and Washington D.C. Five of the comments were submitted by non-governmental organizations, 4 were submitted by private citizens, and 2 were submitted by Federal agencies or commissions. A total of 4 written correspondences were from the State of Washington, representing 36 percent of the total written correspondence received. The tables below present the 11 comments received and our responses to them.

Animal Welfare Institute – Comments Submitted August 10, 2012 by D.J. Schubert

COMMENT CODE	COMMENT	RESPONSE
AWI-1	On behalf of the Animal Welfare Institute (AWI), I submit the following scoping comments on an Environmental Impact Statement (EIS) related to the Makah tribe's request for the authorization of a treaty right hunt of eastern North Pacific gray whales in the tribe's usual and accustomed fishing grounds off the coast of Washington State (77 Federal Register 29967). AWI commends the National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NMFS) for its decision to terminate the previous Makah/gray whale EIS process given the new information and changed circumstances directly relevant to the environmental impacts of the proposed whale hunt. AWI has consistently held that the Makah Tribe does not qualify to be granted an aboriginal subsistence whaling (ASW) quota by the International Whaling Commission (IWC) and, therefore, there is no legal basis to engage in this National Environmental Policy Act (NEPA) decision-making process. Consequently, while AWI will fully participate in this new decision-making process, the entire process is unnecessary and a waste of taxpayer dollars. The purpose of the scoping process is to provide the public with an opportunity to identify concerns and issues that it believes the government must evaluate in its NEPA analysis. AWI has provided a list of these concerns and issues below (in no particular order) with a brief explanation of the importance or relevance of these issues to the pending analysis.	Comments noted.
AWI-2	1. Compliance with IWC criteria: NMFS must provide a comprehensive explanation of how the Makah Tribe meets the IWC criteria for ASW. Merely relying on the IWC's past and recent approval of the US government's quota request as evidence that the Makah meets the definition of ASW and subsistence use is not sufficient. Rather, NMFS must provide compelling evidence that the Makah, despite its cessation of whaling for over 80 years (with the exception of one authorized kill in 1999), satisfies the "continuing traditional dependence" standard contained in the IWC definition of ASW. In presenting this evidence, NMFS must articulate the myriad reasons why the Makah, including those engaged in whaling, ceased whaling in the late 1920s which was not solely due to declining gray whale numbers but also was a product of increased economic profits available to them by working on a sealing boat. The IWC's definition of ASW makes it clear that to qualify for an ASW quota, a group or tribe must engage in whaling for the purpose of "local aboriginal consumption" and must have a "continuing traditional dependence on whaling and on the use of whales." For the Makah to qualify for an ASW quota it must be able to demonstrate a continuing traditional dependence on whaling and on the use of whales. The Makah does not and cannot meet either standard. Furthermore, "local consumption" is defined by the IWC as "the traditional uses of whale products by local aboriginal, indigenous, or native communities in meeting their nutritional, subsistence, and cultural requirements. The conjunction "and" in this statement makes it clear that local aboriginal consumption is only met when nutritional, subsistence, and cultural requirements are all met.	Refer to Subsection 1.4.1, Summary of Aboriginal Subsistence Whaling Catch Limits.

COMMENT CODE	COMMENT	RESPONSE
	Finally, since "local aboriginal consumption" is linked to the "continued traditional dependence on whaling and on the use of whales," to satisfy this definition NMFS must demonstrate that the Makah has a continuing traditional dependence on whales to meet its nutritional, subsistence, and cultural needs. The Makah's claim that it has had a continuing traditional dependence on whales as a result of its ongoing cultural reverence and celebration of whales and whaling is not sufficient to meet this definition. Even if the NMFS were to somehow claim that cultural need alone is sufficient to satisfy the "continuing traditional dependence" criteria in the IWC definition of ASW, it must prove through the disclosure of, for example, tribal records of past events and celebrations, that the tribe's claimed continuing culture dependence on whales is real and not merely rhetoric. If NMFS cannot document how the Makah satisfies the IWC definition of ASW or subsistence use it should announce the termination of this new NEPA process, amend its bilateral agreement with the Russian Federation to remove reference to the sharing of any IWC gray whale quota, and advise the IWC Secretariat that the US will not allocate any gray whales from the joint (US and Russia) gray whale quota approved at IWC/64.	
AWI-3	2. Compliance with NEPA in seeking an ASW quota from the IWC: NMFS must provide a rational legal explanation for its decision to seek a gray whale ASW quota from the IWC prior to completing its NEPA analysis of the impact of the proposed hunt. As explained in a June 22, 2012 letter from Meyer, Glitzenstein & Crystal (attached) to NMFS, the government's decision to seek the quota prior to complying with its NEPA responsibilities violated both NEPA and the court's opinion in Anderson v. Evans. This premature action violated NEPA by engaging in an action prior to evaluating the impact of that action on the environment. In this case, the act of seeking or requesting the quota from the IWC is inextricably intertwined with a clear intent to allocate the quota to the Makah. Indeed, it is inconceivable that the US government would expend the time and resources to obtain the gray whale quota if it did not intend to allocate the quota. Furthermore, because of the link between seeking and allocating the quota, NMFS has irrevocably compromised the integrity of this new NEPA process before a Draft EIS has even been published. In other words, the entire decision-making process has become nothing more than a make-work exercise for which NMFS has already predetermined the outcome of the process, in violation of NEPA. In addition, by prematurely seeking the ASW quota from the IWC, NMFS has also contravened the clear intent of the court in its ruling in Anderson v. Evans. In that opinion, the court raised concerns about the precedential impact of the Makah obtaining a quota from the IWC since the Makah doesn't clearly satisfy the IWC's ASW criteria. The court questioned how the granting of such a quota could affect or influence other native tribes, First Nations people, or other countries which may also have a desire to engage in ASW. To address this issue it would only be sensible to do so before the quota was requested so that the analysis of potential precedential impacts could be completed before the quota was sought and granted, after which the precedent has already been set. Consequently, to evaluate the precedential impacts now is meaningless. Unless NMFS can provide a rational legal basis for its decision to seek an ASW quota prior to completing its NEPA review, it should, to protect the integrity of the NEPA process, inform the IWC Secretariat that it	As noted in the 2008 DEIS (Subsection 1.2.4.1.4, United States' IWC Interagency Consultation), negotiating positions advocated by the United States are not final agency actions; these positions may change during the negotiations. The United States' negotiating positions advocated before the IWC, moreover, may or may not be adopted by the IWC, and any attempt to analyze effects on the human environment would be speculative.

COMMENT CODE	COMMENT	RESPONSE
	has decided not to accept the ASW quota for gray whales approved at IWC64, ask the Secretariat to amend Paragraph 13 of the Schedule to revise and reduce the number of gray whales permitted to be taken under the relevant ASW quota accordingly, and terminate the current bilateral agreement with the Russian Federation which provides for sharing of the gray whale quota.	
AWI-4	3. Precedential impact of seeking, obtaining, and/or allocating the quota: As indicated above, the court in Anderson v. Evans explicitly raised concerns about the precedential impact of the US obtaining a gray whale quota for the Makah and subsequent allocation of that quota. Though NMFS erred in not engaging in this analysis prior to seeking a gray whale quota at IWC/64, it must provide a comprehensive evaluation of this issue in the Draft EIS. Though the Makah may be the only US Native American tribe to have whaling explicitly addressed in its treaty with the US government (The Treaty of Neah Bay), the evaluation of precedential impacts must extend beyond the Makah to other US Native American tribes, to First Nations in Canada, to tribal groups in other countries, and to other countries that may elect to use the US receipt of an ASW quota from the IWC or the possibility of active whaling by the Makah as justification or precedent to permit, authorize, engage in, or seek permission to allow hunting of gray whales.	Refer to the following Subsections: 1.4.3, Other Environmental Assessments and Court Decisions Informing this Action; 3.17, National and International Regulatory Environment; 4.17, Regulatory Environment Governing Harvest of Marine Mammals; and 5.16, National and International Regulatory Environment.
AWI-5	4. Treaty interpretation and legal implications of the MMPA in regard to the authorization to whale contained in the treaty language: Beyond merely reporting that the Treaty of Neah Bay explicitly authorizes the Makah to engage in whaling, NMFS must examine the context in which this provision is contained and whether the MMPA effectively abrogates this treaty right. As an initial matter, the Treaty recognizes the Makah's right to whale but only "in common with all citizens of the United States." At the time the Treaty was signed in 1885, the US was a whaling nation allowing both whaling by citizens for aboriginal and commercial purposes. As a result, the language used in the Treaty was clearly intended to permit the Makah to whale if other citizens were also able to whale. Consequently, if the non-tribal citizen was not authorized to engage in whaling, the Treaty language holds that the Makah would also not be provided such authority. Hence, since the Marine Mammal Protection Act (MMPA) prohibits US citizens from engaging in whaling, the Makah similarly cannot be permitted to whale given the treaty language. If there is legal precedent to suggest that the "in common with" language is not relevant in this case, NMFS must cite to and explain such legal precedents. If it can't overcome the plain language and clear intent of the "in common with" language, NMFS should terminate this new NEPA process and inform the Makah that it will only reconsider the tribe' interest in whaling if or when other US citizens have similar opportunities. Furthermore, if NMFS intends to proceed with its review despite the "in common with" language, this would suggest that NMFS is cherry-picking those components of the treaty that it prefers to implement while ignoring those that are problematic. For example, the treaty also contains a provision that prohibits the introduction of "ardent spirits" to the reservation; a provision that has not been upheld or enforced. Finally, NMFS must discuss whether the whaling provision contained in the Treaty of Neah Bay has been abrogated by the promulgation of the MMPA in 1972. The MMPA explicitly prohibited the taking, including killing, of marine mammals by any US citizen. The only exception to this prohibition is an	The purpose of the draft EIS is to analyze potential impacts of alternatives, not to explore or resolve legal debates.

COMMENT CODE	COMMENT	RESPONSE
	exemption provided to Alaskan natives. Hence, when Congress promulgated the MMPA in 1972 – nearly 45 years after the Makah had last killed a whale – it did not provide any exception to the broad prohibitions against the take of marine mammals to recognize the Makah's treaty language. At that time, it is possible that Congress was not advised of the Makah's treaty language. Yet, surely members of the Makah tribe, given the alleged importance of whaling and marine mammals to the tribe, were aware that the legislation establishing the MMPA was being debated in Congress and either advised Congress of its treaty language and was ignored or elected not to inform Congress of its whaling tradition and treaty language because it had no intention of ever resuming whaling. In either case, the fact that Congress did not exempt the Makah from the take prohibitions under the MMPA demonstrates that it intended to abrogate the whaling provision in the Treaty of Neah Bay. If NMFS does not except this premise it must provide a rational, legally coherent argument to demonstrate that the MMPA does not abrogate the Makah's treaty right.	
AWI-6	5. Resident gray whales: NMFS must provide a comprehensive discussion of the biology, ecology, and behavior of the resident gray whales, also known as the Pacific Coast Feeding Aggregation. This analysis must include an assessment of the genetics of this unique group of whales, how these whales differ genetically from non-resident or fully migratory whales, how whales are recruited into the PCFA, daily and seasonal distribution patterns of these whales (i.e., proportion of time spent in coastal waters versus offshore, when resident whales are known to occupy the water in and around Neah Bay), and the implications of these distribution and genetic differences to the management of the two groups of gray whales. This analysis is particularly important considering that new scientific evidence indicating that the resident and non-resident whales are genetically distinct is one of the reasons why the NEPA process for the proposed hunt has been restarted. Of particular importance, is an analysis of the Makah's proposed hunting strategy and how that may impact the short and long-term survival, genetic diversity, and recruitment of PCFA whales. In 2005, in its request for an MMPA waiver, the Makah had proposed a hunting strategy in which they intended to minimize the potential killing of resident whales by hunting further offshore and by establishing a subquota of two resident whales to be identified through photographs taken after the whales were killed and landed. Though this proposal was flawed to begin with, it was made at a time before scientific evidence provided proof of the genetic distinctiveness between resident and non-resident whales. Subsequently, it is not clear if the Makah have amended their proposed hunting strategy to address this new evidence. If so, the new hunting strategy should be fully disclosed and evaluated in the Draft EIS. Furthermore, if the Makah's strategy remains the same as that proposed in 2005 or if it has changed but is still based on establishing a subquota of resident whales, there must be discussion of how any struck and lost whales will be counted against the subquota and whether any observer will be assigned to monitor each hunt to ensure that any and all struck and lost whales are properly reported. Presumably, any whales that are struck and lost will be considered resident whales and, therefore, will count toward any proposed resident whale quota. If this is not the case, NMFS must explain why.	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 2.3, Alternatives Considered for Detailed Study; 3.4, Gray Whales; 3.4.3.4, Pacific Coast feeding Group (PCFG) of Gray Whales; 4.4.2, Evaluation Criteria (Gray Whales); 4.4.2.3, Change in Abundance and Viability of PCFG Whales; 4.4.3, Evaluation of Alternatives; 5.4, Gray Whales (Cumulative Effects).

COMMENT CODE	COMMENT	RESPONSE
	There also must be an analysis of the proportion of the known or estimated resident whales for which identification photographs have been taken, how any non-photographed resident whales will be considered when evaluating photographs of killed whales, who possesses the catalog of resident gray whale photographs, who will be responsible for comparing photographs of any killed whales to the catalog of resident whales, what methodology would be used to conduct the comparison (e.g., computer assisted, human comparison only), the accuracy of the method used to compare photographs, how any potential but non-exact matched photographs will be addressed, the chain of custody of the photographs of killed whales, the timetable for engaging in the comparative analysis of photographs, and who will be responsible for obtaining photographs of any killed whales, if that person or those persons are properly qualified and by whom.	
AWI-7	6. Western gray whales: NMFS must provide a comprehensive analysis of the frequency with which critically endangered Western gray whales (WGW) have been documented as migrating across the Bering Sea from Russia to Alaska to enter the migratory corridor of the Eastern North Pacific (ENP) gray whale. This analysis must include all historical evidence of such movements (documented using photographic identification) and more recent incidents of such interactions (documented through photographic identification and the use of electronic tags). Of particular importance is information regarding the timing (by month) of estimated (based on photo-identification and average swimming speeds), known (based on electronic tag data), and predicted (based on modeling of future WGW movements) WGW presence in the Makah's usual and accustomed hunting areas and surrounding areas, and the duration of WGW remaining in these areas, any evidence of WGW remaining in the area beyond the traditional south or northbound migratory periods. Considering that the scientific documentation of WGW entering the ENP gray whale migratory corridor was another basis for terminating the previous NEPA process, this analysis is crucial to the new NEPA process. Of particular importance is to fully disclose and evaluate the potential for the Makah to kill a WGW based on whatever proposed hunting strategy may be employed. The strategy proposed in 2005 did not contemplate any potential killing of WGW since, at that time, it had not been known that WGW were entering the migratory corridor of the ENP gray whales. If the Makah has proposed changes to its hunting strategy to eliminate or minimize the potential for killing a WGW, these changes must be disclosed and fully analyzed. Furthermore, even if NMFS claims that the potential for the killing of a WGW is low, it can't suggest that there is no risk. Consequently, NMFS must disclose and discuss what penalties would be imposed on the Makah if a WGW was killed (if a hunt is permitted), if the Makah would be subject to criminal penalties or fines under the Endangered Species Act, if an Incidental Take Permit would be issued to the Makah and the process used to issue that permit, how the killing of a WGW would impact the recovery of this critically endangered whale stock, and how such a kill would impact the continuation of the hunt both for that season and long-term. This assessment must include an assessment of how a kill of a WGW would be verified. If photo-identification would be used, NMFS must disclose what proportion of known WGW have been	In response to this and related comments, we have included WNP gray whales in our analysis in the new DEIS. Refer to the following Subsections: 2.3, Alternatives Considered for Detailed Study; 3.4, Gray Whales; 3.4.3.2, Western North Pacific (WNP) Gray Whales; 4.4.2, Evaluation Criteria (Gray Whales); 4.4.2.2, Change in Abundance and Viability of WNP Gray Whales; 4.4.3, Evaluation of Alternatives; 5.4, Gray Whales (Cumulative Effects).

COMMENT CODE	COMMENT	RESPONSE
	photographed, who maintains the WGW photographic catalog, who would be responsible for photographing any gray whales taken by the Makah, what training would that person or those persons receive in obtaining such photographs, what the chain of custody would be for handling any photographs, how the photographs would be compared (i.e., computer assisted, human eye comparison only), the accuracy of the method of comparison, and how any struck and lost whales will be categorized. Considering the critically endangered status of the WGW and given the precautionary principle, it would be reasonable to categorize any struck and lost whale as a WGW for the purpose of evaluating the conduct of any proposed hunt. To ensure that any and all struck and lost whales are accurately reported, this again raises the issue of the potential need for an observer to monitor each hunt. Similarly, since there is evidence of WGW transiting the Makah's usual and accustomed hunting grounds and, therefore, any hunt (if allowed) could potentially result in the killing or the harassment of WGW, NMFS must include in the Draft EIS a full evaluation of the biology, ecology, behavior of the WGW. This analysis must also evaluate all threats to the WGW (i.e., oil/gas developments, shipstrikes, ASW, ocean noise, pollution) throughout their known migratory range (including within the migratory range of the ENP gray whale) since the Makah hunt would pose a direct and indirect impact to the WGW and would add to the cumulative impact of all threats to this stock.	
AWI-8	7. Threats to the gray whale throughout its range: One of the significant flaws in the previous Draft EIS was the failure by NMFS to fully disclose and evaluate the full suite of threats to the ENP gray whales and gray whale habitat throughout the stock's entire range (from the Arctic to Mexico). Instead, in that Draft EIS NMFS focused its analysis on threats on the PCFA or resident whales only. This mistake must not be repeated in this new Draft EIS. Gray whales and their habitat are subject to a host of threats throughout their range. Many, but not all, of these threats are identified below. These and all other known threats to gray whales must be fully disclosed and evaluated in the DEIS. Climate change: There is overwhelming scientific evidence that climate change is affecting the chemistry and ecology of the oceans in profound ways resulting in direct, indirect, and cumulative impacts on marine species and their habitats. For gray whales such impacts include, but are not limited to, the expansion of dead areas where oxygen levels in the water are not sufficient to sustain life including the benthic and other organisms that gray whale feed on, increases in the acidity of ocean water adversely affecting other potential gray whale prey, changes in current patterns potentially affecting gray whale prey, and alterations in the structure of ecosystems from benthic to pelagic as a result of ocean warming and the concurrent changes in sea ice extent and melting patterns. All of the impacts (and others) could drastically impact the gray whale but the documented shift from benthic to pelagic driven systems in the gray whales historically important summer feeding areas is of particular concern. Though it is now known that the gray whale can survive on a variety of prey species, it is less clear if all prey species provide the same amount of nutritive value and caloric energy for gray whales. Despite the ability to utilize other prey species, benthic amphipods remain a critically important item in the diet of gray whales. The documented shift in historically important Arctic feeding areas from benthic systems (maximizing production of amphipods) to pelagic systems (where most of the food is consumed by fish	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 3.0, Affected Environment; 3.2, Water Quality; 3.4.3.6, Known and Potential Anthropogenic Impacts; 3.17 National and International Regulatory Environment; 3.6.3.3.2, Commercial Value of Whales; 3.16.3.2, Environmental Contaminants in Gray Whales; 4.0, Environmental Consequences; 5.4, Gray Whales (Cumulative Effects).

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	prior to reaching the amphipods on the sea floor) has reduced amphipod densities throughout the gray whales summer feeding area. As a result, gray whales are migrating further north in search of food including additional amphipod patches. What is not clear is how amphipod densities change as the whales move north, whether the seafloor substrate is suitable for amphipods, what species of amphipods may exist further north, and their nutritional and caloric value. There is significant scientific evidence documenting these types of changes and though some have suggested that gray whales, as ecological generalists, may not suffer adverse consequences as a result of climate change, there is compelling evidence to suggest otherwise. ASW: It is obvious that ASW represents a threat to gray whales. This would include ASW conducted by Russian Natives and the potential for ASW to be conducted by the Makah. While the IWC Scientific Committee has reported that the current gray whale quota is sustainable, of all of the current threats to gray whales, ASW is the one threat that is entirely under human control and could be reduced or eliminated much easier than ameliorating other threats to the species. The analysis of ASW in the Draft EIS must expand beyond whatever the Makah may propose to include a full analysis of the impacts of the Russian hunt on ENP gray whales. This analysis must include disclosure of hunt statistics including the size, sex, and age of all whales killed by Russian natives, location of kills, number of struck and lost whales, and any evidence of contamination (i.e., stinky whale, toxins, heavy metals). Shipstrikes: ENP gray whales migrate along one of the busiest shipping areas in the world. As a consequence, shipstrikes represent a threat to gray whales. The Draft EIS must disclose all evidence of the number of shipstrikes on gray whales throughout the gray whale range including its entire migratory corridor. This must include any information on the fate of struck whales. Gray whale deaths caused by ship strikes represent a cumulative impact to the stock which must not be discounted or ignored. Entanglement in fishing gear: Given their tendency to primarily use coastal waters during their migration, gray whales are susceptible to entanglement in fishing gear. Though total number of such verified incidents may not be high, NMFS must consider the frequency of known entanglements, an estimate of unreported entanglements, and the fate of gray whales subject to entanglement incidents in the Draft EIS. Furthermore, it must disclose the types of fisheries operating in US, Canadian, and Mexican waters that use gear that may pose a risk to gray whales, the type of gear used, and any mitigation measures that may be employed to reduce the potential for such incidents. Ocean noise: Ocean noise has increased exponentially over the past few decades. Ocean noise in gray whale range, including their migratory corridor, is particularly severe considering ship traffic, recreational vessel use, oil/gas exploration, military activities, and coastal development. Though the understanding of noise impacts on marine mammals remains incomplete, it has been documented that noise can result in a litany of adverse impacts including permanent hearing loss, temporary hearing loss, masking, avoidance reaction, disruption of feeding/breeding activities, alterations in swimming speeds, and behavioral implications that can have adverse consequences. These impacts can drastically impact gray whales and other marine species and, therefore, must be fully disclosed and discussed in the Draft EIS. In conducting this assessment, NMFS must disclose all of the Incidental Harassment Authorizations and Letters of Authorization that it has issued	

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	or will issue (and that remain in effect) and evaluate the cumulative impact of all such authorizations on the gray whale. Military activities: NMFS must evaluate the impact of all military activities conducted within the summer range, winter range and migratory corridor of the gray whale. This includes any military activities conducted by Canadian or Mexican military personnel with the gray whale range. Within US waters, in recent years, various military bases in California and Washington have either been permitted to increase their training activities, to expand the range of activities, or proposals to do so are currently being evaluated. In most if not all cases, NMFS has permitted such changes in military activities or is engaged in the review of any proposed changes. Consequently, NMFS must disclose information about all existing, expanded, increased, or proposed military activities within the range of all gray whales and within the range of PCFA gray whales and assess the impacts, including the cumulative impact, of the activities on gray whales and their habitat. Such impacts including, but are not limited to, military development activities, range expansion, military testing, explosive use, weapons testing, active sonar use, and military drills and readiness training. Oil/gas exploration: The US government, despite concerns about potential massive oil spills, well blowouts, and other complications associated with oil/gas development, has permitted both oil/gas exploration activities and development activities in the Arctic and elsewhere within the gray whales range. These and any similar activities permitted by Canadian and Mexican authorities in the Pacific Ocean (within the migratory range of the gray whale or within the summer range of PCFA whales) must be disclosed and their impacts to gray whales and gray whale habitat assessed in the Draft EIS. Such impacts include, but are not limited to, those associated with exploration activities (i.e., seismic testing, noise associated with ship traffic, potential for shipstrikes) and development activities (i.e., noise impacts caused by drilling activities, potential for shipstrikes, and noise associated with ship traffic). Renewable energy development projects: NMFS must disclose and evaluate the impact of any existing or planned renewable energy development projects (e.g., offshore wind turbines, ocean wave energy systems, underwater tidal energy systems) within the summer range of the PCFA or migratory range of ENP gray whales. This would include any renewable energy development projects permitted or under consideration by Mexican and Canadian government agencies. Impacts from such projects may include, but are not limited to, impacts from the noise generated by the energy devices and potential entanglement or injury caused by any lines or tethers used to anchor equipment in place. Whalewatching: The popularity of whalewatching has increased throughout the world. Gray whales are a popular species for whalewatching because of the extensive migration and tendency to utilize coastal waters make them relatively easy to observe throughout much of their migratory range in Alaska, Canada, the US (Washington, Oregon, and California), and Mexico. Furthermore, in Mexico gray whales provide unique opportunities for whalewatching in the birthing lagoons where there are opportunities to interact with both adult and newborn gray whales. Despite the economic and education value of whalewatching, it can result in adverse impacts as a result of disturbance, harassment, avoidance behaviors, and due to the risk of injury from whalewatching vessels. NMFS must identify all whalewatching companies that provide opportunities	

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	to observe gray whales throughout their migratory range, disclose what regulations are in place in the US, Canada, and Mexico to regulate whalewatching operations, assess the effectiveness of such regulations including the level of enforcement, and assess the impact of such activities on gray whales both during their south and northbound migrations. Pollution, contaminants, toxins: The migratory range of the ENP gray whale includes areas that are known to be highly polluted as a result of ship traffic, coastal development, industrial activities, and due to the significant number of people that live along the coast – particularly in California, Oregon, Washington and in British Columbia, Canada. In addition, wherever there may be oil/gas operations throughout the range of the gray whale there is the potential for oil/gas spills that can directly impact gray whales and their habitat. As a consequence, gray whales are subject to exposure to a number of pollutants including, but not limited to, heavy metals, oil/gas residues, and persistent organic pollutants. Since gray whales are considered bottom feeders (though they also feed on prey in the water column) the impact of pollutants on gray whales includes those toxins to which the whales are exposed in the water, in the prey they consume, or in any contaminated substrate that may be ingested. NMFS must identify all such sources of air/water pollution throughout the migratory range of the gray whale, including in Canada and Mexico, identity the pollutants being discharged, document the fate of the pollutants in the ocean environment, assess the potential for gray whales to be exposed to each pollutant, evaluate the risk that each pollutant poses to gray whales, and assess the cumulative impact of all such pollutants on gray whales. Furthermore, NMFS must also consider evidence of contamination of gray whale meat and blubber and how this may impact humans if the Makah are permitted to whale. Considering the long history of killing and consuming gray whales among native people of the Russian Federation, NMFS should consult with Russian scientists, medical personnel, and public health officials to determine what, if any, testing has been done to assess the contaminant load of gray whale meat/blubber consumed in Russia and what impact such consumption may have had on the health of those native people who consume whale products. In addition, there is an expanding body of literature both providing evidence of significant evidence of contamination found in whales and other marine animals and the corresponding impact on those who consume products from these animals. This information should also be reviewed in the preparation of the DEIS. Predation by orcas and sharks: Though orcas and sharks have always been the primary predators of gray whales, there is evidence that predation rates, particularly on gray whale calves, have increased. In years of high calf production, an increasing predation rate may not have any population level impacts but, when calf production is low (as has been documented many times in the past 15 years), the predation rate may pose yet another threat to gray whales particularly in light of the existing and future impacts of other threats. This increase may be, in part, due to what appears to be a larger proportion of calves being born in the open ocean – including off of central California – which is a product of the documented delay in the initiation of the southbound migration as gray whales have expanded their range further north in the Arctic in search of food. Calves born in the open ocean are substantially more susceptible to predation by orcas and sharks compared to calves born in the protected lagoons. In addition, the energetic demands placed on calves born in the open ocean (to maintain body temperature in colder waters and to accompany their mothers on their	

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	southward migration) also may increase their susceptibility to predation. NMFS must disclose and evaluate the risk of gray whale predation by orcas/sharks, estimate the proportion of the population that may be affected each year, and otherwise assess the impact of predation in light of other direct, indirect, and cumulative threats.	
AWI-9	8. Gray whale population estimates and demographics: The gray whale is one of the most studied cetacean species in the world. This is, in part, due to the tendency of gray whales to migrate in coastal waters facilitating access to them in the ocean and permitting observation of them from land stations. As a result, there is considerable data available on gray whale population estimates based largely on census of south and northbound gray whales. Nevertheless, when the published population estimates are compared there are groups of years where the reported increase in gray whale numbers is biologically impossible. Though scientists have reexamined some of these data and have altered various correction factors and other measures to improve the accuracy of such estimates, the validity of the estimates remain in question. NMFS, therefore, must provide a comprehensive overview of all such population estimates, the methodologies used to calculate them, and changes made to the various correction factors used to develop population estimates in the Draft EIS. It also must disclose an up-to-date gray whale population estimate in the Draft EIS that is based on the most recent data and most scientifically credible census methodologies.	Refer to the following Subsections: 3.4.3.1, General Life History and Biology; 3.4.3.3, Eastern North Pacific (ENP) Gray Whales. The above DEIS subsections incorporate relevant abundance-related information published in research papers by Laake et al. (2012)* and Durban et al. (2013)**. Those research papers should be consulted for the more comprehensive treatment of methodologies and correction factors requested in this comment. * Laake, J.L., Punt, A., Hobbs. R., Ferguson, M., Rugh, D. and Breiwick, J. 2009. Re-analysis of gray whale southbound migration surveys, 1967-2006. NOAA Technical Memorandum NMFS-AFSC-203. 55 p. ** Durban, J. Weller, D., Lang, A. and Perryman, W. 2013. Estimating gray whale abundance from shore-based counts using a multilevel Bayesian model. Paper SC/65a/BRG02 presented to the International Whaling Commission Scientific Committee [Available from http://www.iwcoffice.org/]
AWI-10	9. Economic impact of the hunt: The economic impact of any proposed hunt is not limited to merely the alleged economic benefit or harm to the Makah if they are or are not allowed to whale. Indeed, considering that US laws don't allow edible whale products to be sold and considering that the Makah have not engaged in whaling, with the exception of the single whale legally killed in 1999, for over 80 years, there likely is no direct economic benefit or harm to the tribe if it is or is not allowed to whale. There may, however, be indirect economic impacts to the local community if whaling is permitted as a result of expenditures made in preparation of whaling and/or expenditures made by enforcement agencies, protestors or others who may be involved in overseeing or opposing the hunt. The economic impacts of the hunt, however, extend far beyond such indirect effects. Though NMFS and other federal agencies rarely address the full range of economic impacts in NEPA documents, other impacts include those associated with the killing of one or more whales and the detrimental impacts to the tribe as a	Refer to the following Subsections: 3.6 and 4.6, Economics; 3.7 and 4.7, Environmental Justice; 3.8 and 4.8, Social Environment; 3.10 and 4.10, Ceremonial and Subsistence Resources. With respect to comments about, the purpose of the draft EIS is to analyze potential impacts of alternatives, not the history of federal funding or conjecture about how those funds could have been used.

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	result of its expenditures of funds to gain approval for whaling (an effort that has been ongoing for nearly twenty years) while sacrificing other tribal needs. This is not to suggest that the resumption of whaling may not be of great importance to some members of the tribe but is identified here only to recognize that the tribe's effort to reinitiate whaling may have detracted from meeting other tribal needs. A whale has economic value. In this context, since the meat/blubber of the whale cannot be sold (though handicrafts created from whale parts may be able to be sold by the Makah under US law), the whale is worth very little financially to the Makah. However, a live whale is worth a significant sum of money in terms of its existence value, its role in the ecology of the ocean, its reproductive potential, and its value to the whalewatching industry. If a whale is killed by the Makah, his or her present and future economic value is lost. NMFS must consider this economic value in the Draft EIS by placing a numeric value on a live gray whale (e.g., through social science surveys or examining relevant social science/recreational/whalewatching literature) and then assessing the cost of losing the whale if killed by the Makah versus whatever economic benefit the whale would represent to the Makah. In addition, NMFS should disclose the funds used by the Makah, at least since the mid-1990s, in its efforts to resume whaling. This should include the source of the funds (i.e., private, tribal, federal, other) and how the funds were spent (i.e., scientific study, legal representation, state/federal lobbying, travel, meeting attendance/participation). To assess the impact of such expenditures on the tribe, NMFS must then identify other needs of the tribe and its people (i.e., education, health care, elder care), the costs of meeting such needs, and whether the funds expended in promoting the resumption of whaling could have helped meet any of these other needs. Such an analysis would aid in helping the public to understand how efforts to resume whaling may have affected other tribal needs and whether the alleged value of resuming whaling (i.e., social, cultural) outweighs the value to address other pressing tribal needs. Finally, NMFS must disclose the amount of federal funds that it or other federal agencies (e.g., Bureau of Indian Affairs) have provided to the Makah for its use to gain government approval to resume whaling. This would include, but would not be limited to, any funding provided to the Makah for any scientific research, lobbying costs, travel to promote whaling and/or to seek government approval for whaling, legal costs, or travel to attend meetings of the IWC. The public has a right to know if its federal tax dollars are being used to support the Makah's efforts to resume whaling and, therefore, such information must be disclosed in the Draft EIS.	
AWI-11	9. Alternative: NMFS indicates in the Federal Register notice announcing the termination of the old EIS process and initiation of a new process that it intends to consider five alternatives: No Action, Tribe's Proposed Action, Offshore Hunt, Summer Management Hunt, and Adaptive Management Hunt. Considering the fact that the Makah does not meet the IWC criteria to obtain an ASW quota, the risk of any hunt to PCFA whales and WGW, and the significant and ongoing threats to gray whales and their habitat, AWI strongly supports the No Action alternative. Though it has no objection to NMFS considering the other alternatives identified, none of them, given all of the facts relevant in this case, should ultimately be selected at the conclusions of the decision-making process.	The suggested alternatives are addressed in the following Subsections: 1.2, Legal Framework; 1.4.1, Summary of Aboriginal Subsistence Whaling Catch Limits; 2.4, Alternatives Considered but Eliminated from Detailed Analysis (in particular 2.4.1, Non-lethal Hunt and 2.4.7, Alternative Compensation to the Makah Tribe).

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	Furthermore, the list of alternatives identified by NMFS is not complete. Two other alternatives that it should, at a minimum, seriously consider in the Draft EIS would be an alternative to assist the Makah in establishing a whalewatching operation to provide visitors with both a unique opportunity to observe gray whales and other marine mammals while also introducing them to Makah history and culture. A second alternative that should be evaluated is the possibility of reaching an agreement with the Makah whereby it will agree not to exercise its treaty rights (assuming they have not been abrogated by the passage of the MMPA) in exchange for funding and/or other support from the US government to meet other tribal needs. This could include the return of lands to the Makah and/or the provision of funding, technical support, or materials to meet other tribal needs. This alternative is suggested based on a similar agreement reached a few years ago between the Canadian government and one of its First Nation tribes. Conclusion: The intent of the scoping process is to provide the public with an opportunity to identify those issues or concerns that they believe the government should consider in it NEPA analysis. In this letter AWI has provided a litany of issues and concerns relevant to the proposal to permit the Makah tribe to resume whaling. It fully expects that each of these issues will be seriously considers by NMFS and that each issue and concern will be subject to discussion and analysis in the Draft EIS. Though AWI will fully participate in this decision-making process, it reiterates that this process should not go forward. The Makah does not satisfy the criteria to receive an ASW quota from the IWC and, therefore, should not be permitted to whale. The only reason the US has been granted a gray whale quota by the IWC is because it has combined its request with the Russian Federation. If the US had sought a gray whale quota for the Makah independent of the Russian Federation, AWI is confident that the quota would have been denied. Furthermore, as articulated above, even though the Treaty of Neah Bay has been claimed to provide the Makah with a right to whale, the language of the treaty makes clear that any whaling conducted by the Makah must be "in common with all citizens of the United States." Since US citizens who are not members of the Makah tribe are not permitted to engage in whaling, the treaty language makes clear that such permission cannot be granted to the Makah. Finally, even if the treaty language is not an obstacle to whaling, the promulgation of the MMPA clearly abrogates any whaling right articulated in the treaty. For all of these reasons, this new planning process should be terminated to avoid the US wasting any additional time or federal funds on this undertaking. AWI appreciates the opportunity to submit these scoping comments. Should you have any questions about the content of this letter, please contact D.J. Schubert at dj@awionline.org or via telephone at (609) 601-2975. Please send any further correspondence on this issue to D.J. Schubert, Animal Welfare Institute, 202 Cranberry Court, Egg Harbor Township, NJ 08234.	
AWI-12	ATTACHMENT Meyer Glitzenstein & Crystal 1601 Connecticut Avenue, N.W.	Attachment noted.

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	Suite 700 Washington, D.C. 20009-1063 Katherine A. Meyer Eric R. Glitzenstein Howard M. Crystal William S. Eubanks 11 Jessica Almy Telephone (202) 588-5206 Fax (202) 588-5049 www.meyerglitz.com June 22, 2012 BY ELECTRONIC AND U.S. MAIL Dr. Douglas Demaster Acting U.S. Commissioner to the International Whaling Commission c/o National Oceanic and Atmospheric Administration United States Department of Commerce 1401 Constitution Avenue Washington, DC 20230 Dear Dr. Demaster: We are writing on behalf of the Animal Welfare Institute, Australians for Animals, California Gray Whale Coalition, Cetacean Society International, Dolphin Connection, Fluke Foundation, Green Vegans, Pacific Whale Foundation, Peninsula Citizens for the Protection of Whales, TerraMar Research, Whale and Dolphin Conservation Society, The Whaleman Foundation, Ms. Sandra Abels, Mr. Will Anderson, Ms. Tami Drake, Mrs. Patricia Ness, Mr. Robert Ness, Mrs. Margaret Owen, Mr. Chuck Owens, and Toni Frohoff, Ph.D. to urge you to remove the United States' request for an aboriginal subsistence whaling (ASW) quota of Eastern North Pacific (ENP) gray whales from the draft Schedule Amendment to the International Whaling Commission (IWC). As we will explain, such a request- which we understand is being made on behalf of the Makah tribe of northwest Washington State- may not be submitted until an Envirom11ental Impact Statement (EIS) is completed in compliance with the Ninth Circuit Court of Appeals' ruling in Anderson v. Evans, 371 F.3d 475 (9th Cir. 2004). Background Because of the long history behind the United States' effort to obtain a gray whale ASW quota for the Makah tribe, it is critical to briefly summarize that history to put the present issue in the appropriate context.	

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	The Makah tribe has not had a tradition of whale hunting since the 1920s. In 1995, after the tribe decided it would like to resume whaling, NOAA prepared a report to consider whether the United States should support this effort, which would require an amendment to the whaling schedule established by the IWC. In that report, NOAA recognized that a resumption of whaling by a tribe that has not engaged in this traditional practice for so long could encourage, and serve as a precedent for, other tribes to also seek whaling authorization. See Metcalf v. Daley, 31 4 F.3d 11 35, 1 1 37-39 (9th Cir. 2000) (summarizing this history), Despite that concern, and without analyzing the impacts such a precedent may have on the environment in general, and on gray or other whale populations in particular, NOAA entered into several agreements with the tribe pursuant to which the United States then supported Schedule amendments seeking IWC approval of an ASW gray whale quota. After the initial effort to obtain a gray whale quota was withdrawn from consideration at the 1996 meeting, a second proposal was presented at the 1 997 meeting that combined ASW quotas for the US (for the Makah) and Russia (for its aboriginal people). Although the proposed Schedule amendment was adopted, delegates were concerned that granting a quota to the United States to allocate to the Makah would open the door to whaling by other groups that no longer have a whaling tradition- echoing the concern NOAA had identified in its original report. Id. at 1 1 39-40; see also Firestone and Lilley, Aboriginal Subsistence Whaling and the Right to Practice and Revitalize Cultural Traditions and Customs, 8 Journal of lntl Wildlife Law and Policy 1 77, 1 98 (2005) (explaining that "[b]ecause of the precedent that would be set if Makah whaling were approved-authorizing subsistence whaling where there had been a long hiatus in whale hunting by an aboriginal group--and in light of Japan's effort to gain IWC authorization for community-based coastal whaling, the U.S. proposal generated controversy among IWC members.") (emphasis added). The National Environmental Policy Act (NEPA) requires that NOAA prepare an appropriate analysis of the environmental impacts of, and alternatives to, Makah whaling. 42 U.S. C.§ 4321, et seq. In 1 997, a group of plaintiffs (including several of the groups submitting this request) sued NOAA for its failure to complete this analysis- which had been prepared in an Environmental Assessment (EA)- before deciding to support the resumption of Makah whaling. In 2000, the Ninth Circuit Court of Appeals ruled for the plaintiffs, suspending NOAA's Agreement with the tribe and approval of Makah whaling until appropriate NEPA analysis has been completed. Metcalf, 21 4 F.3d at 1 1 46. NOAA subsequently prepared a new EA and once again approved Makah whaling - and these decisions were once again set aside. In this second Ninth Circuit decision, the Court determined that before NOAA may decide whether to support Makah whaling the agency must first complete an Environmental Impact Statement (EIS), which must address two particular issues, among others. Anderson, 371 F.3d at 489-494. First, the Court found that NOAA must analyze the extent to which the plam1ed Makah whaling may have significant impacts on the local gray whale population in the area where the tribe intends to hunt Particularly because the tribe no longer intended to carry out plans designed to limit the hunt to migrating whales, the Court concluded that there were significant concerns that Makah whaling might deplete the number of local whales in the area. Those risks, the Court concluded, must be analyzed in an EIS. Id at 490-492.	

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	Second, reiterating a concern NOAA itself had recognized in its original Report on Makah whaling, and that IWC delegates had recognized in opposing the quota, the Court concluded that NOAA must analyze the extent to which the IWC granting a whaling quota to be used by the Makah may serve as a precedent leading to increased whaling by others. In particular, the Court noted that if the Makah- who have not whaled for many decades – are deemed to be engaged in traditional subsistence whaling, "the heretofore narrow aboriginal subsistence exception" may be significantly widened, and that "[i]f such an increase in whaling occurs, there will obviously" be serious impacts on whale species. ld. at 493-494; see also Firestone and Lilley at 202 ("The panel also faulted the EA for failing to properly consider the effect of the decision to permit the Makah to whale on other Native American tribes that may wish to hunt whales as well as its effect on other IWC member countries"). The Court in Anderson also concluded that Makah whaling is governed by the Marine Mammal Protection Act (MMPA), and thus that the tribe must also obtain proper authorization under that statute before whaling may proceed. Based on these concerns, the Court once again suspended NOAA's Agreement with the Makah, vacated the whaling quota, and directed NOAA to prepare an EIS. ld. at 494. In 2008, NOAA released a Draft EIS on Makah whaling. However, just a few weeks ago NOAA withdrew that Draft EIS and announced that, in light of significant new information the EIS process would begin anew. 77 Fed. Reg. 29,967 (May 21, 2012). As explained in the recent notice, "several substantive scientific issues" have recently arisen that must be considered and addressed, including the extent to which gray whales from the endangered western stock may be migrating into the area where Makah whaling would occur, and the recent scientific evidence demonstrating that the resident gray whales are genetically distinct from the migratory whales. Id. at 29,968.[1] Despite these Court rulings and most recent developments, the United States has recently submitted a proposed Schedule amendment that combines its ASW quota requests on behalf of the Makah (gray whales) and Alaska1 native people (bowhead whales) with quota requests by the Russian Federation (gray and bowhead whales) and St. Vincent and the Grenadines (humpback whales). The proposed Schedule amendment, to be considered at the upcoming IWC meeting, if approved by the IWC, would allow the United States to allocate gray whales to the Makah for whaling between 2012-2018 if not barred by outstanding domestic requirements[2] As we explain below, the United States may not present such a proposed amendment to the IWC at this time. Discussion Since NOAA first began considering the Makah's effort to resume the killing of gray whales after many decades without whaling, there have been serious concerns that allowing the Makah to resume whaling n1ay encourage, and serve as a precedent for, others who have not whaled in many years to also seek whaling authorization- including both other United States tribes, as well as groups from other JWC countries. As the Court recognized in Anderson, while the IWC has recognized ASW, the "precise reach of the exception"	

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	allowing such whaling has always been "unclear." 371 F.3d at 483. However, prior to the Makah's effort to resume whaling, the IWC had limited the exception to whaling that was "related to a continuing traditional dependence on whaling and on the use of whales." ld. at 496 (emphasis added). Thus, in its original Report, NOAA recognized that Makah whaling, by opening the door to whaling that does not involve a "continuing" tradition, may lead to expanded whaling by others. Daley, 31 4 F.3d at 1 1 37-39. This was also a major issue when the Makah quota was originally considered by the JWC, and it remains a serious issue today. See generally Beck, The Makah's Decision To Reinstate Whaling: When Conservationists Clash With Native Americans, 1 996 Journal of Envtl Law and Lit., 359, 381-402 (1 996) (summarizing precedential concerns). The Court in Anderson also explicitly recognized this concern, explaining that an JWC gray whale quota intended for the Makah may "make it easier for [other] groups to gain approval for whaling." 371 F.3d at 493, and n.17 (citing Jenkins and Romanzo, Makah Whaling: Aboriginal Subsistence or a Stepping Stone to Undermining the Commercial Whaling Moratorium, 9 Colo. J. Int'l Envtl. L. & Policy 71, 88-89 (1 998). As noted, the Court therefore directed NOAA to prepare an EIS that, among other things, explored this potential for opening the door to expanded whaling and the impacts of such a precedent. To date, NOAA has not completed such an EIS. To the contrary, NOAA just recently withdrew the draft EIS that it had prepared and intends to begin the entire process anew. Moreover, NOAA has also recognized other serious issues that must be addressed in an EIS, including the potential for risks to endangered western stock gray whales. Under these circumstances, not only is it entirely premature to present a Schedule amendment to authorize Makah whaling, doing so contravenes NEPA and the Court's Anderson ruling. Certainly, the potentially precedential effect of the Schedule amendment must be considered in an EIS before the amendment is adopted. Otherwise, that discussion in the EIS will be a make-work exercise, since it will not be informing any decision whether to seek authorization from the IWC. Indeed, as the Court's decision in Metcalf makes plain, NEPA's procedures only work when an agency considers the impacts of, and alternatives to, actions before they occur. 21 4 F.3d at 1 1 46; see also. e.g., Andrus v. Sierra Club, 442 U.S. 347, 351 (1979) (explaining that the NEP A process must be completed "early enough" so as to "insure that planning and decisions reflect environmental values"); WildWest Institute v. Bull, 54 7 F.3d 11 62, 1165 - 1 166 (9th Cir. 2008) (explaining that an EIS must "serve practically as an important contribution [and may] not be need to rationalize or justify decisions already made")[3] NOAA cannot defend its failure to complete an EIS before a Schedule amendment is presented by the United States to the IWC on the grounds that actions before the IWC have no environmental impacts by a federal agency, and thus are not governed by NEPA - an argument NOAA has presented in other contexts. See, e.g., EIS for Subsistence Hunt on Bowhead Whales for the Years 2008 through 2012 at 2 10 (Jan. 2008). Such an argument is foreclosed by Anderson, which held that the mandated EIS must consider, among other things, "the precedential impact of our government's support for the Makah Tribe's whaling in	

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	future JWC deliberations." 371 F.3d at 493 (emphasis added). Thus, under Anderson it is absolutely clear that an EIS must be completed before the United States may propose the new Schedule amendment for the Makah. of Defenders of Wildlife v. Gutierrez, 532 F.3d 9 13, 925-28 (D.C. Cir. 2008) (rejecting the argument that the Coast Guard's participation in international proceedings before the International Maritime Organization (IMO) exempted the Coast Guard from domestic law in connection with decisions made at the IMO). The fact that the IWC approved an ASW Schedule amendment in 2007 that included the United States also does not undermine the conclusion that the present amendment is premature. Before the Makah can engage in whaling NOAA must complete not only an EIS, but the MMPA waiver process as well. Though the 2007 amendment was for five years, NOAA has been unable to complete either the EIS or MMPA waiver processes. The current proposed Schedule amendment, by contrast, extends for six years. Given that time, the work that has already been done on the now defunct Draft EIS for Makah whaling, and the potential for completing the MMP A process, there is every reason to assume that, unlike the last amendment, the Makah will obtain whaling authorization under this current proposed Schedule amendment- thereby establishing the precedent that must be analyzed in an EIS. Moreover, even assuming arguendo that, once again, the quota obtained by the Schedule amendment is never allocated to the Makah (as in 2007), the United States is only further aggravating the precedential effect of its actions here. In particular, other tribes in the United States, or even groups from other countries, may seek to obtain IWC whaling quotas in the absence of domestic authorization for such whaling. Once again, these are all matters that, under Anderson, must be considered by NOAA in an EIS, \\\lhich must be completed before the United States takes further steps to authorize Makah whaling. There is also no urgency to obtaining a gray whale quota now, rather than once NOAA is able to comply with federal law- by both completing the NEPA process and issuing an MMP A waiver to the Makah tribe. At that time, the United States can return to the IWC to seek a gray whale quota for the Makah tribe, even if this is before the ASW quota issued for the take of gray whales by aboriginal groups from other countries has expired. In conclusion, the United States may not seek an ASW gray whale quota for the Makah at this time, given the lack of an EIS as mandated in Anderson; thus the proposed Schedule amendment should be modified to remove any reference to the United States seeking a gray whale quota. If the United States wants to seek a gray whale quota for the Makah, it must ensure that its domestic requirements and responsibilities are addressed first and then, and only then, seek a quota from the IWC. Seeking a quota now is entirely premature and fatally undermines the Court-mandated NEPA process. Moreover, the ongoing efforts to secure a gray whale quota for the Makah could undermine the United States' efforts to achieve its other objectives at IWC/64, including obtaining a renewal of the bowhead whale quota. Considering the current status of the IWC, taking up valuable Commission time by seeking a	

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	quota that the United States is legally barred from requesting or using may be counterproductive toward other United States supported efforts. In addition, while there was no opposition to the United States' request for an ASW gray whale quota in 2007, this is unlikely to be repeated at the upcoming meeting in light of the new scientific information about so-called resident whales and interactions between Eastern and Western North Pacific whales. This is yet another reason why the United States should remove any reference to its request for a gray whale quota from the proposed Schedule amendment. For all these reasons, we urge the United States to: 1) withdraw its request for a gray whale quota from the proposed Schedule amendment and adjust the remaining quota numbers accordingly; 2) withdraw the Makah Needs Statement from consideration by the ASW Subcommittee; 3) suspend the bilateral agreement with Russia to share a gray whale quota from the IWC; and 4) agree to take no further steps toward obtaining a gray whale quota from the IWC on behalf of the Makah until the NEPA and MMPA processes mandated by Anderson are completed. Sincerely, Howard M. Crystal Trevor Smith cc: Ryan Wulff, NOAA/NMFS Roger Eckert, NOAA/NMFS Melissa Andersen, NOAA/NMFS Lisa Phelps, Department of State Donna Darm, NOAA/NMFS Rollie Schmitten Mike Tillman Trevor Smith [1] Recent photo-identification and radio-tagging data demonstrate the presence of highly endangered Western gray whales (e.g., Flex in 20l0/11 and Varvara in 2011/12) within the migratory corridor of the Eastern North Pacific population, including within the Makah's Usual and Accustomed hunting area. [2] Although the Schedule amendment does not identify the Makah, NOAA has explained that these amendments "never mention particular aboriginal tribes," Anderson, 371 F.3d at 496, and so far the Makah is the only Native Americm1 tribe or group from the United States with a Statement of Need on file with the JWC to hunt gray whales. See http://www.iwcofllce.org/conservation/aboriginal.htm. [3] Indeed, the United States' effort to seek a gray whale quota at the IWC is inextricably intertwined with its intent to allocate the quota to permit whales to be killed (i.e., the United States would not seek the quota unless it intends to allocate the quota). NEPA specifies that "connected actions"- actions that "are closely related"- "should be discussed in the same impact statement." 40 CFR 1508 .25(a)(1). Actions are	

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	considered "connected" if they "automatically trigger other actions which may require environmental impact statements, cannot or will not proceed unless other actions are taken previously or simultaneously, and/or if they are interdependent parts of a larger action and depend on the larger action for their justification." See 40 CFR 1508.25 (a)(l)(i-iii). Thus, it could not be more clear that NEPA review is required on the IWC Schedule Amendment, and that the review must be completed before the Amendment is proposed.	

C. Owens - Comments Submitted August 8, 2012

COMMENT CODE	COMMENT	RESPONSE
CO1	Comments to Makah DEIS From Charles Owens--8-8-12 1. My first suggestion to this DEIS is that I believe NMFS/NW should be removed from this process entirely and replaced by another NMFS region. NMFS/NW has shown they are too imbedded with the Makah tribe to make an unbiased and scientific decision on this issue. And above all these resident whales would have been wiped out if NMFS had gotten their way, this alone disqualifies NMFS/NW. I will expand on this in part 3 of my comments.	We disagree with the assertion that NMFS staff have been biased and unscientific in their review of the tribe's request. Regarding the comment about resident whales, refer to Subsection 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales.
CO2	Knowing that my first suggestion will be ignored, I recommend a moratorium on any whaling for 5 to 10 years to allow science to catch up with all the new information concerning the Western grays in the Makah U & A, and genetic research of our local resident gray whales.	Comment noted.
CO3	2. I whole- heartedly endorse the comments of NOAA's recent head of the US IWC delegation, Monica Medina, when she proclaimed; "reject the Makah's request for a permit to kill whales." [article reproduced below] "Illegal Hunting Turning Clock Back On Whales" Publication: The Hartford Courant Author: Monica Medina 09/26/2007 - The illegal killing of a gray whale off the coast of Washington state earlier this month by five members of the Makah Nation caused a public outcry, and justifiably so. No one in this country has the right to unilaterally decide to kill a whale without a permit. As we learned this week, the numbers of gray whales left on Earth are nowhere near what they once were. Stanford University researchers report that their historic populations were around 100,000, three to five times larger than previously believed. The current population estimate of 22,000 eastern Pacific gray whales is actually a fraction of the pre-whaling levels. And that population is increasingly stressed. There is new evidence that gray whales are now thin and starving, possibly a result of changes in the oceans resulting from global warming and overfishing. This is ominous news for the health of the whales, and our oceans as well. It has been 25 years since the international community agreed to a moratorium on commercial whaling. There is no question that this major conservation achievement saved many whale species, including gray whales, from the brink of extinction. However, in the past decade, there has been steady erosion in the protection of the world's great whales. This is of concern not only because whales are special creatures that generate awe and wonder but also due to the many roles they play in the ocean ecosystem as predators and prey. Fortunately in this country we have laws against the action taken by these five individuals who decided that "the time was right" for the Makah to resume whale hunting. Although the federal government has granted the Makah a permit to kill whales in the past, this time there was no permit. The Makah leaders have stated that they will do the right thing and prosecute these hunters under tribal law. The U.S. government must also prosecute them under federal law, and reject the Makah's request for a permit to kill whales. The situation outside U.S. waters is much worse. Currently, too many nations exploit loopholes in the international rules that ban	Comment noted. The cited publication by Monica Medina was published as an opinion piece by the Pew Charitable Trusts and prior to her appointment as the U.S. Commissioner to the IWC in 2010. During her tenure as Commissioner the U.S. conveyed an opening statement to the 2011 IWC meeting that it "strongly supports aboriginal subsistence whaling" and noted its appreciation for the Makah tribe's "important scientific contributions on eastern North Pacific gray whales."

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	commercial whaling. Only in extremely limited circumstances are whales permitted to be killed, such as when they are needed to feed communities with limited sources of food. And yet more than a thousand whales are killed annually because whalers exempt themselves from the moratorium on commercial whaling. Their actions are no different from those of the five Makah hunters. They are in open defiance of the rules against hunting. For many years the whaling nations by and large abided by the rules and took only a minimal number of whales. However, beginning in the late 1990s, the world's few remaining whaling nations decided to defy the intent of law by exploiting loopholes in the moratorium and began large-scale industrial whaling operations. As a result, whale hunting has escalated at an alarming rate. And little is being done about it. Powerful nations including the United States refuse to use their diplomatic clout to hold these whaling nations accountable for their actions. The world's whales deserve better protection than they are getting now. What is lacking is the resolve to abide by and enforce the global regulations on whaling. The international body that governs whaling, the International Whaling Commission, is a weak institution with no enforcement capability. Its feckless commercial whaling "ban" and purported "sanctuaries" afford whales no protection from whalers who feel it is their right to kill these majestic and sentient creatures where and when they choose. And with half the commission in an alliance with the whalers, this lawless behavior is allowed to continue. We need to reform the International Whaling Commission so that international laws provide whales the same standing that the gray whale killed this past weekend has under U.S. law. The United States must step in and lead the nations of the world in this endeavor. Only then will the world's whales will be safe from lawless hunters. *Monica Medina is director of whale conservation for the Environment Group of The Pew Charitable Trusts.*	
CO4	3. Conflicts of interest, cronyism and more. A. The consulting firm NMFS hired to produce the environmental assessment - Parametrix Inc. of Auburn - has a work history with the Makah (and NMFS) that includes managing a $ 10 million contract to pave the road from Neah Bay to Cape Flattery on the tribal reservation. Also the tribe has hired Parametrix to do a Corridor Management Plan for a tribal scenic byway. And more??	As is allowed by Federal law (40 CFR 1506.5c), we employed a contractor to assist in preparation of the 2008 DEIS, under the supervision of NMFS staff, and using a competitive and documented process to select Parametrix. At the beginning of the contract, the contractor disclosed that it also had a contract with the Makah Tribe to assist in the development of the Cape Flattery Tribal Scenic Byway Scenic Corridor management plan. After the unauthorized hunt in September 2007, members of the public raised questions about additional work Parametrix was performing for the Tribe. When questioned by NMFS about the additional work, Parametrix provided information on the details of the subsequent contract, and affirmed that it had obtained the work for the Tribe in a competitive process.

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		Also as required by law, Parametrix and its subcontractors signed disclosure statements prepared by NMFS as affidavits that there is no conflict of interest by being employed by both the Tribe and NMFS (40 CFR 1506.5c). We accepted the disclosure statements in good faith, and conducted due diligence reviews of Parametrix's role as a contractor for the Tribe. We concluded that there was no potential for conflict to occur, and further, no biased information could be inserted into the DEIS under our sole supervision. Producing an EIS is the responsibility of the Federal action agency (40 CFR 1506.5(a)(c)). We are responsible for the content and process. We do not consider the relationship between Parametrix and the Tribe to have compromised the integrity of Parametrix's work product, and in any event are confident that in exercising our oversight we have ensured the document is a product of our analysis.
CO5	B. The Makah's hired marine mammal biologist is Jonathan Scordino, son of Joseph Scordino, former Deputy Northwest Regional Director for Fisheries Service in Seattle. Joe Scordino was a key figure in this effort to green-light whaling.	The comment implies the existence of a conflict of interest but makes no connection between the analysis required in our DEIS and the fact that the marine mammal biologist employed by the Makah Tribe is related to a former NMFS employee.
CO6	C. NMFS, prior to and after the whale hunt of 1999 hired key members of the whaling crews, notably Wayne Johnson, captain of the whaling crew.	The comment makes no connection between the analysis required in our DEIS and the reported hiring of whaling crew members.
CO7	D. NMFS personnel butchering the 1999 whale for the Makah and complaining about having to butcher it for the tribe. (all caught on film, NMFS has seen this film)	Many people participated in the butchering of the whale, including members of the Makah Tribe and NMFS personnel.
CO8	E. Pat Gearin, NMFS biologist, has worked in Neah Bay for many years. I was informed by a harbor master in Neah Bay that it was Gearin who told him and other major players that "there's money in them whales" and that is what kick started this whole mess! Gearin also allowed the Makah to harvest a beached whale	The impetus for the Makah Tribe's hunt request is documented in Section 1, Purpose and Need.

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	within Olympic National Park (Yellow Banks), in violation of numerous federal laws in 2001. There were no consequences for Gearin or the tribal members. (see article below for more, and responses from those who seem to have gotten caught with their fingers in the cookie jar!) Whaling opponents allege federal conflicts of interest A group of whaling opponents says the federal agency that conducted a probe into an unauthorized Sept. 8 whale hunt has close ties to the Makah tribe whose members it investigated. The National Marine Fisheries Service, a division of the National Oceanic and Atmospheric Administration, has conflicts of interest that are "almost incestuous," in the words of Chuck Owens of Joyce. Fisheries Service also is overseeing the federal court-ordered environmental impact statement on the tribe's request to resume authorized whaling. Owens said he wants an FBI investigation of the relationships. He said he would spread his campaign across the country with the help of a national animal advocacy group. Owens founded Peninsula Citizens for the Protection of Whales, which has opposed the tribe's hunting gray whales off the Washington Coast and in the Strait of Juan de Fuca since the 1990s. "We don't trust NMFS," he told Peninsula Daily News. "They've never given us a reason to trust them. "The Makah preserved their whale-hunting rights in the 1855 Treaty of Neah Bay and legally killed a 30-foot female gray whale off the Washington state coast in 1999. Enjoined from more hunts by a federal appeals court, the Makah have sought an exemption from the Marine Mammal Protection Act that NMFS enforces. Last month, however, five tribal members harpooned, shot and killed a gray whale in the Strait of Juan de Fuca, and Fisheries Service investigated the unauthorized action. 'Cronyism' denied Fisheries Service denied the overall allegation of "cronyism" and the specific examples that Owens cited. They include: The Makah's recently hired marine mammal biologist is Jonathan Scordino, son of Joseph Scordino, former Deputy Northwest Regional Director for Fisheries Service in Seattle. The consulting firm Fisheries Service hired to produce the environmental assessment - Parametrix Inc. of Auburn - has a work history with the Makah that includes managing a contract to pave the road from Neah Bay to Cape Flattery on the tribal reservation. A Fisheries Service investigator of the Sept. 8 whale hunt, John Haupt, is a Makah tribal member whose mother has served for many years as secretary to the tribal council. Haupt also is related to one of the five defendants. Alleged nepotism Speaking for Fisheries Service, Donna Darm, regional administrator for protected resources, said Joseph Scordino retired in January, several months before the Makah hired his son. The elder Scordino, Darm said, had transferred his environmental assessment duties to her two years earlier, when the Makah renewed their request to hunt whales. He had worked on the issue for three years, according to Owens. Also, Darm said, Jonathan Scordino worked for Fisheries Service as a consultant on a killer whale study from March 2007 to July, when he joined the tribe as its marine mammal biologist. According to Makah Tribal Council member Micah McCarty, Jonathan Scordino was hired by a personnel committee. "My impression is that he was the best candidate fair and square," McCarty said. Joseph Scordino confirmed that the Makah hired his son but	

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	said, "They hired my son because he met the requirements of the job." Jonathan Scordino did not return calls from the PDN. Parametrix's double role Darm said the company had performed and passed a review of potential conflicts of interest. "They did disclose the fact that they were assisting the Makah Indian Nation with the development of the Cape Flattery Scenic Byway Corridor," Darm said. The road project is supervised by a Parametrix subsidiary, TranTech Engineering LLC of Bellevue. Jeff Peacock, executive vice president at Parametrix, told the PDN, "We have absolutely nothing to hide." As for his firm's double involvement with the tribe, he said, "That's a huge stretch to link those two. "We were required before we ever entered into that [road] contract to make sure there was no interaction there. "None of our folks that are working on the environmental impact statement are involved in the construction." Parametrix manages only the road-building contract, Peacock added. "The big dollars are being consumed by the contractor," Scarsella Brothers Inc. of Seattle, on the $10 million project. Peacock also challenged Owens' motives. "I could see how somebody who wants to undermine a process might want to do that," he said. McCarty, too, denied an improper relationship between the tribe and Parametrix. "It's a relatively large company that specializes in contract management work for a number of different entities," McCarty said. "There are internal firewalls that are put in place [against conflicts of interest]. They're completely different people." Regarding the environmental impact statement. Darm said, "the draft EIS is a NMFS document Those documents are not the contractor's documents. They are our documents." Haupt, who has confirmed he is a Makah member, has declined further comment. McCarty, however, said Haupt's tribal membership made it "probably good that he was the guy on the scene" after five tribal members shot and killed the whale last month. "He knows where to find people; he knows who's who," McCarty said. "He's a professional man who doesn't allow conflicts of interest to affect his work. I think it's a shame people who don't know him are attempting to defame him." Taking claims nationwide Peninsula Citizens for the Protection of Whales said it will disseminate its allegations nationwide with the help of the Animal Welfare Institute of Alexandria Virginia. AWI, according to Owens, "is putting a big list of conflicts of interest together." The group, which received $2.9 million in contributions in 2005, spent more than $83,000 in lobbying efforts. It was founded in 1951. Chuck Owens is joined in the effort by his wife, Margaret. For the last 10 years, the Owenses have protested the Makah whale hunts, which the tribe maintains are its right under its 1855 treaty with the United States. The couple called for an FBI investigation of the conflicts but said their main motive is putting the allegations on the record. "We're being pre-emptive with our critique so we've left a paper trail of protest," said Margaret Owens. However, both McCarty and Joseph Scordino said the couple repeatedly had attacked individual tribal members and Fisheries Service employees during the controversy. 'Anti-whaling extremists"	

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	"These anti whaling extremists wantonly and shamelessly practice defamation of character," McCarty told the PDN. "They're stooping too low on this one." Said the elder Scordino, "The Owenses have done that with other people too. This isn't surprising to me that they would be focusing on my son." Owens said, "The only reason we've attacked them is that we've had the facts. "We don't go after these guys unless we have it documented." Of the Scordino hiring, "that is wrong," he said. "They knew they should never have done that." Of Fisheries Service, the Makah and Parametrix's involvement in the environmental statement and the investigation, Owens said, "This should be an unbiased look at this issue, and you can't do it when the tribe's paying off their consultants." And regarding Haupt, he added, "He should have recused himself from the very beginning." "The whole point is we have seen their past history and their recent history," Owens said. "They are not to be trusted. We just want a better investigation." Reporter Jim Casey can be reached at 360-417-3538 or at jim.casey@peninsuladailynews.com.	

C. Rorabeck - Comments Submitted July 16, 2012

COMMENT CODE	COMMENT	RESPONSE
CR-1	Dear NMFS, The fact that researchers have recently discovered that the severely endangered Western Gray Whales travel across the Pacific and utilize the area that the Makah claim are their huntings grounds, is enough to warrant the only choice of action as Alternative 1. Aside from the fact that a whale suffers a long and painful death at the hands of man, the Makah, if allowed to hunt, would be at risk of killing a race of whale that is nearly extinct. I encourage you to look at the research, and to consider the vast amount that we still do not know about these whales. Sincerely, Cheryl Rorabeck	In response to this and related comments, we have included WNP gray whales in our analysis in the new DEIS. Refer to the following Subsections: 2.3, Alternatives Considered for Detailed Study; 3.4, Gray Whales; 3.4.3.2, Western North Pacific (WNP) Gray Whales; 3.4.3.5, Welfare of Individual Whales; 4.4.2, Evaluation Criteria (Gray Whales); 4.4.2.2, Change in Abundance and Viability of WNP Gray Whales; 4.4.3, Evaluation of Alternatives; 5.4, Gray Whales (Cumulative Effects)

California Gray Whale Coalition - Comments Submitted August 10, 2012 by S. Arnold

COMMENT CODE	COMMENT	RESPONSE
CGWC-1	As an initial comment, the Coalition contends that NMFS is acting ultra vires in seeking comments and promoting the Makah DEIS given that the US IWC delegation has requested and been granted a quota at the Panama IWC meeting in the full knowledge that no waiver bas been pitted and due legal process has been ignored. This action by the administration is completely unacceptable, unethical, and unlawful.	Refer to Subsection 1.2, Legal Framework.
CGWC-2	The DEIS makes a complete mockery of the NEPA process.	Refer to Section 1, Purpose and need
CGWC-3	On March 31 and April 1, 2012, the Coalition held a Scientific Workshop on the ENP Gray Whale in San Francisco. A number of experts were invited from Mexico, Canada, the Russian Federation as well as experts from the USA. On the basis of the recommendations of this workshop, the Coalition supports Alternative 1:- No Action.	Comment noted.
CGWC-4	The Coalition has, as a result of the workshop, identified a number of issues which need to be included in the scope of issues to be included in this ridiculous DEIS. There are no current population estimates for the ENP Gray Whale on the SWFSC website with the out of date 2006/7 field study still being quoted as the most current estimate. It is simply outrageous that in August 2012, there are no published population estimates for 2009/2010 and 2010/2011.	Refer to Subsection 3.4.3.3.3, ENP Abundance and Trends.
CGWC-5	The re-analysis of the gray whale population (Laake 2009) should be an injunction to review all PBRs over the period and to review whether these PBRs were accurate or incorrect and what impact they may have had on the population.	Estimates of PBR rely on a minimum population estimate that is based on the best available scientific information on abundance (Section 3(27)(A) of the MMPA). However, such estimates can be expected to vary as minimum population sizes and other PBR parameters change. Refer to Subsection 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates.
CGWC-6	Issues raised at the workshop which should be included in any EIS are: • Impact of massive changes in the Chirikov Basin where foraging bas shifted from amphipods to polychaetes and the ramifications of these changes to the population. • Implications of extension of the northward migration and impacts on energy budgets of whales. • Impacts of dramatic and ongoing change in sea ice conditions in the Arctic and sub-Arctic breeding and feeding grounds. • Anthropogenic impacts on gray whales and their habitat as a result of the exponential increase in oil and gas exploration; noise; climate change, ocean acidity, toxic wastes, increased shipping, potential oil spills, stress and disease.	Refer to the following Subsections: 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem; 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates; 3.4.3.6.11, Climate Change and Ocean Acidification; 4.4.3, Evaluation of Alternatives (Gray Whales); 5.1.3, Past, Present, and Reasonably Foreseeable Future Actions; 5.4, Gray Whales (Cumulative Impacts).

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	• The sheer extent of oil and gas exploration in the ENP gray whale feeding grounds and impacts. • Cumulative noise impacts from seismic surveys, infrastructure.	
CGWC-7	• Lack of research and information on the number of cows and calves leaving the count areas along the west coast and arriving at the Chukotka breeding grounds in. This information is essential in ascertaining mortality of calves. • Mexican cow/calf counts and cow/calf counts along the west coast need to use standard methodology so counts have variability removed.	Comment noted, refer to Subsection 3.4.3.1.5 Reproduction and Calf Production.
CGWC-8	• Transient orca predation is significant with mortality estimates ranging from 8-60%. Better assessments are needed and studies need to be expanded so that information can be integrated across the range of the species throughout the year.	Comment noted, refer to Subsection 3.4.3.1.6, Natural Mortality and Subsection 5.1.3.8, Natural Mortality.
CGWC-9	• Government delay in releasing census numbers is a major concern. Given the re-evaluation of population estimates (Laake 2009), the lack of current information is completely unacceptable.	Refer to Subsection 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates.
CGWC-10	• Stinky whales are increasing in numbers and this problem is also apparent in seabirds, fish, and seals in the Chukotka region.	Refer to Subsection 3.4.3.6.2, Environmental Contaminants, and Subsection 3.16.3.2, Environmental Contaminants in Gray Whales.
CGWC-11	• Introduction of Western Pacific gray whales into the ENP migration route and in the Baja Lagunas. • Significant risks to Western Pacific Gray whales by any Makah hunt. • Implications of the Western Pacific Gray whales moving into ENP areas needs to be addressed	Refer to the following Subsections: 2.3, Alternatives Considered for Detailed Study; 3.4, Gray Whales; 3.4.3.2, Western North Pacific (WNP) Gray Whales; 4.4.2, Evaluation Criteria (Gray Whales); 4.4.2.2, Change in Abundance and Viability of WNP Gray Whales; 4.4.3, Evaluation of Alternatives; 5.4, Gray Whales (Cumulative Effects).
CGWC-12	• Genetic research by Palumbi, Alter et al. continues to support an original population of at least 70,000.	NMFS responded to this issue in its 2010 Stock Assessment Report for the ENP stock of gray whales.* Refer to Subsection 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates. * Allen, B.M., and R.P. Angliss. 2010. Alaska marine mammal stock assessments, 2010. U.S. Dep. Commer., NOAA Tech Memo. NMFS-AFSC-223, 292 p.
CGWC-13	• Lack of research covering breeding, migration and foraging.	Gray whales are the subject of considerable research on these and other aspects of their life history and ecology. NMFS scientists and

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		funding support a wide variety of gray whale research activities, as do the efforts and funding of other entities. The monitoring and research conducted by NMFS and others is too extensive to list here, but is summarized in a separate 2015 NMFS scoping report. That report contains the recommendations from the 1994 and 1999 NMFS monitoring plans and describes the monitoring and research done since 1994 and 1999, respectively. The 2008 DEIS and new DEIS include references to most of the publications that have resulted from that research and monitoring.
CGWC-14	• Stable isotope analysis of tissue, baleen or bone is needed to evaluate changes in diet and foraging.	Comment noted.
CGWC-15	• Inter-annual variation of gray whale population and calf production is not taken into account with current NMFS management policies.	Changes in minimum population estimates can and do influence PBR calculations which in turn influence management of gray whales as described in the action alternatives. Refer to the following Subsections: 2.3, Alternatives Considered for Detailed Study; 3.4.2.1.1, Defining Marine Mammal Population Parameters; 3.4.2.1.2, Calculating Marine Mammal Population Parameters; 3.4.2.1.3. Linking Marine Mammal Population Parameters to Removals; 3.4.2.1.4, Defining and Calculating PBR; 3.4.2.1.5, Implementing the PBR Approach; 3.4.2.1.6, Stock Assessment Reports; 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates; 4.1, Introduction (Environmental Consequences).
CGWC-16	• Inter-annual variation of gray whale population and calf production is not adequately addressed by the IWC Scientific Committee which relies on US information.	Comment noted, refer to Subsection 3.4.3.1.5 Reproduction and Calf Production.
CGWC-17	• The Makah tribe request to hunt Gray whales is not a subsistence hunt and creates an alarming precedent for other IWC member countries to seek similar non subsistence quotas. • The Makah tribe request weakens the IWC convention.	Refer to the following Subsections: 3.17, National and International Regulatory

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	• Any waiver granted under the MMPA to the Makah could set a precedent for other Native American Indian tribes to claim discrimination and seek similar rights.	Environment; 4.17, Regulatory Environment Governing Harvest of Marine Mammals.
CGWC-18	• The US IWC delegation should not have sought a quota at IWC Panama meeting for the Makah without first securing a waiver under the MMPA. Yours sincerely, Sue Arnold CEO California Gray Whale Coalition P.O. Box 50939 Palo Alto, CA 94303	Comment noted (also refer to response to comment AWI-3).

U.S. Environmental Protection Agency – Comments Submitted August 4, 2012 by E. Peterson

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EPA-1	Re: U.S. Environmental Protection Agency (EPA) scoping comments on the National Marine Fisheries Service (NMFS) Notice of Intent (NOI) to terminate the existing and prepare a new Environmental Impact Statement (EIS) related to the Makah Indian Tribe's request to authorize treaty right hunting of eastern North Pacific gray whales in usual and accustomed fishing grounds off the coast of Washington State. EPA Region 10 Project Number: 08-030-NOA. Dear Mr. Stone: The EPA has reviewed the NMFS Federal Register NOI in accordance with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309 specifically directs the EPA to review and comment in writing on the environmental impacts associated with all major federal actions. Our review of the EIS prepared for the proposed action will consider expected environmental impacts and the adequacy of the EIS in meeting procedural and public disclosure requirements of the NEPA. A copy of our rating system is enclosed.	Comment noted.
EPA-2	For us, a key difference between the 2008 draft EIS alternatives and the May 21, 2012 NOI alternatives is the addition of Alternative 5: Adaptive Management Hunt. The addition of Alternative 5 is notable because all of the 2008 alternatives and alternatives 1-4 in the 2012 NOI consider relatively inflexible, distinct and complete schemes of spatial, temporal and take limit requirements. Alternative 5, in contrast, is a management scheme that would allow for flexibility in: " … Permit terms; hunting seasons; allowable levels of struck, struck and lost and landed whales up to the levels proposed by the Tribe and methods of calculating an allowable bycatch level for PCFG whales." Your interest and effort to plan for effective adaptive management appears appropriate given this waiver request's recent history. Namely, the need to terminate the 2008 draft EIS due to substantive scientific issues that arose after its release. In order to adequately disclose any related adaptive management plan, we recommend the EIS describe: • The proposed adaptive management approach; • How the approach is reflected in the alternatives being considered; • The monitoring protocol; • The desired outcome; • The performance measures that will determine whether the desired outcome is being achieved or an adaptive action is needed; and • The factors for determining whether additional NEPA review is needed.[1] In addition to the views of the 'NEPA Task Force' quoted above, we believe the Council on Environmental Quality's "Draft Guidance for NEP A Mitigation and Monitoring"2 is a useful reference for developing and	Information regarding the commenter's recommendations can be found in the following Subsections: 2.3.6, Alternative 6 (Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits); 4.1.6, Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits. In addition, relevant information can be found for the various resources in our evaluation of Alternative 6 in Subsections 4.2 through 4.17.

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	disclosing an effective adaptive management framework. Thank you for this opportunity to comment and if you have any questions or concerns, please contact me at, (206)-553-6382 or by email at peterson.erik@epa.gov. Sincerely, Erik Peterson Environmental Review and Sediment Management Unit [1] See p. 52 at: http://ceq.hss.doe.gov/ntf/report/chapter4.pdf [2] http://ceq.hss.doe.gov/nepa/regs/Mitigation and Monitoring Draft NEPA Guidance FINAL 02182010.pdf	
EPA-3	ATTACHMENT U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action* Environmental Impact of the Action LO-Lack of Objections The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal. EC - Environmental Concerns EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts. EO - Environmental Objections EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts. EU - Environmentally Unsatisfactory EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected	Attachment noted.

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	at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ). Adequacy of the Impact Statement Category 1 -Adequate EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information. Category 2- Insufficient Information The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft ElS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS. Category 3 - Inadequate EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ. * From EPA Manual 1640 Policv and Procedures for the Review of Federal Actions Impacting the Environment. February. 1987.	

Green Vegans – Comments Submitted August 10, 2012 by W. Anderson and T. Drake

COMMENT CODE	COMMENT	RESPONSE
GV-1	Re: Scoping Comments/Makah Request for a waiver under the MMPA Pursuant to the Notice of Intent To Terminate the Existing Draft Environmental Impact Statement and Prepare a New Environmental Impact Statement in Federal Register, Vol. 77, No. 98, Green Vegans submits the following comments to be considered in the new Draft Environmental Impact Statement. It is our desire that these comments be included in the permanent record of the Draft Environmental Impact Statement (DEIS). Further, we fully expect NOAA and NMFS to investigate and respond to these comments in the DEIS. The 9th Circuit Court of Appeals ruling in Metcalf v. Daley states: "In summary, the comprehensive "hard look" mandated by Congress and required by the statute must be timely, and it must be taken objectively and in good faith, not as an exercise in form over substance, and not as a subterfuge designed to rationalize a decision already made." We urge NMFS and NOAA to take this "hard look". In media reports, NMFS officials have stated that the Makah will be granted a waiver and that the only variable Is litigation. This bias has not gone unnoticed and must be corrected. NEPA requires that this waiver not be "rubber stamped". NMFS has a fiduciary duty to the public to act Impartially.	Comment noted.
GV-2	Killing whales in US waters with US support and funding is a matter of great national and international importance. It raises complex domestic and International conservation and legal issues which have not been addressed in the previous Environmental Assessments or the previous Draft Environmental Impact Statement.	Comment noted.
GV-3	Alternatives 1. Emergency Relisting of the Eastern North Pacific Gray Whale on the Endangered Species List. Gray whales and their habitat are subject to significant threats. Gray whales are threatened by the direct, indirect, and cumulative adverse Impacts caused by aboriginal kills, documented and undocumented mortality, oil and gas exploration and extractions activities, and noise impacts. Gray whales, their prey, and their habitat are under increasing threats from global warming, El-Nino events, bottom trawling, and contaminants. While several of these factors have individually significant impacts, cumulatively the extent and severity of the impacts indisputably support a listing of this population.	In 2001, we received the most recent petition to relist the gray whale under the ESA, but found that the petition did not present substantial scientific or commercial information indicating that relisting was warranted (66 Fed. Reg. 32305, June 14, 2001). We have continued monitoring the population since delisting. Refer to Subsection 3.4.3.1.3, Population Exploitation, Protection, and Status.
GV-4	2. Renegotiate the Treaty of Neah Bay.	Refer to Subsection 2.4, Alternatives Considered but Eliminated from Detailed Analysis
GV-5	Resources 1. Assess the danger of setting a precedent by granting a waiver to the MMPA. Should the .Makah be granted a waiver to the MMPA, it sets a precedent for the oil and gas industry, other tribes, and the whale watching industry.	With respect to precedential effects for other tribes, refer to the following Subsections: 3.17, National and International Regulatory Environment; 4.17, Regulatory Environment Governing Harvest of Marine Mammals. The

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		comment does not provide sufficient information to discern the concerns regarding the whalewatching and oil and gas industries.
GV-6	2. Assess the impact on all species covered by the MMPA - If the precedent of a waiver for killing gray whales is granted, then the DEIS should have a thorough discussion for each species possibly affected by other waivers and identify the possible parties, tribal and non-tribal. This should be discussed substantially in the DEIS.	We believe such an assessment would be too speculative; refer to 3.17.3.1, Waivers of the MMPA Take Moratorium.
GV-7	3. US support for domestic cultural whaling has undermined their position at the IWC regarding cultural whaling by other nations. At IWC 64, the US delegation bundled the Makah request with Russia, and even more shockingly, with the request to kill humpback whales by Saint Vincent and the Grenadines (SVG), specifically to avoid a determination by the IWC on whether the Makah qualify under the aboriginal subsistence whaling exception to the moratorium. The DEIS should address the strategies the US delegation took to get the Makah quota, and the reasons for "hiding" the Makah quota with Russia and the non-aboriginal SVG hunt. The DEIS also needs to address why the US delegation did NOT make a presentation of the Makah request during the plenary at IWC 64. It appears that they didn't want discussion from those who oppose it.	Comment noted. Subsection 1.4.1.2.2, Overview of Requests for ENP Gray Whales on Behalf of the Makah summarizes the meeting referred to in this comment, however there is no indication that the U.S. was attempting to “hide” the Makah request. The IWC Chair’s Report for that meeting describes the relevant deliberations and that the U.S. noted that the joint proposals were “…all a status quo continuation of existing hunts, and all had been found to be consistent with the IWC’s definition of ASW on previous occasions. Further, the Scientific Committee had reported that the hunts were sustainable, and for these reasons these Governments considered that it was appropriate for the Commission to consider a joint rather than a separate proposal.”* * IWC. 2012. Chair's Report of the 64th Annual Meeting held 2-6 July 2012 in Panama City, Panama.
GV-8	4. The US request for a quota of gray whales for the .Makah at IWC 64 undermines the NEPA process by "predetermining" the outcome. This must be addressed in the DEIS.	Refer to response to comment AWI-3
GV-9	5. Assess the impact on the ENP gray whales killed during whaling operations outside of IWC quotas (i.e. Alaska native hunting and Makah hunting in Russia).	We believe such an assessment would be too speculative.
GV-10	6. Assess the impact on the Pacific Coast Feeding Aggregation (PCFG) and Western gray whales. New scientific evidence demonstrates that the PCFG are genetically distinct from migratory gray whales and there is increasing evidence of critically-endangered Western gray whales migrating to the west coast of North America and traversing the Makah's hunting area. The IWC Scientific committee is still looking at the issue of the impact of a Makah hunt on the endangered Western grays. A determination has not been made by the IWC Scientific Committee and until that happens, the DEIS process should be called off. A	Refer to the following Subsections: 2.3, Alternatives Considered for Detailed Study; 3.4, Gray Whales; 3.4.3.2, Western North Pacific (WNP) Gray Whales; 3.4.3.4, Pacific Coast feeding Group (PCFG) of Gray Whales; 4.4.2, Evaluation Criteria (Gray Whales); 4.4.2.2,

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	definitive evaluation of the Northern Puget Sound population's migratory behavior needs to be included and steps taken to ensure this small, behaviorally significant sun-population[sic] is not target unintentionally or carelessly by the proposed Makah hunt.	Change in Abundance and Viability of WNP Gray Whales; 4.4.2.3, Change in Abundance and Viability of PCFG Whales; 4.4.3, Evaluation of Alternatives; 5.4, Gray Whales (Cumulative Effects).
GV-11	7. A full assessment of so-called "Stinky" whales must be completed and included in the DEIS. Investigation of the overall health of gray whale population and human health consequences of consuming toxic whale meat must be included in the DEIS.	Refer to Subsection 3.4.3.6.2, Environmental Contaminants, and Subsection 3.16.3.2, Environmental Contaminants in Gray Whales.
GV-12	8. Assess the impact of climate change and warming ocean temperatures on gray whale food supply including the impacts of ocean acidification on their food web, the opening of the arctic as sea ice decreases over time.	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 3.0, Affected Environment; 3.2, Water Quality; 3.4.3.6, Known and Potential Anthropogenic Impacts; 3.16.3.2, Environmental Contaminants in Gray Whales; 4.0, Environmental Consequences; 5.4, Gray Whales (Cumulative Effects).
GV-13	9. The DEIS needs to examine the methodology of population estimates over the last ten years, particularly in relation to the PBR and OSP assessments. These assessments cannot be made on questionable or out of date data. Without factoring in major effects caused by global climate change; a severe downturn in amphipod productivity; ecosystem changes and their effects etc; any PBR or OSP assessment is deeply flawed. Without funds to conduct annual population estimates as well as north and south calf counts, the process of establishing PBR and OSP assessments is not current. Given the nature of ecosystem changes which have already occurred, any estimates are purely hypothetical.	Refer to the Subsection 3.4.2.1, Marine Mammal Protection Act Management
GV-14	10. Assess the Impact of oil production from exploratory activities to possible offshore production and underwater pipeline transport on gray whales and their prey. Recent reports are that oil companies are not able to meet Coast Guard criteria for oil spill responses.	Refer to the following Subsections: 3.4.3.6.4 , Oil Spills and Discharges; 3.4.3.6.5 , Offshore Activities and Underwater Noise; 5.1.3, Past, Present, and Reasonably Foreseeable Future Actions; 5.4, Gray Whales (Cumulative Impacts).
GV-15	11. Assess the Impact of seismic surveys on gray whales and their prey. Seismic surveys have been conducted to study geological structure under the seabed in order to determine risk of earthquake damage.	Refer to the following Subsections: 3.4.3.6.4 , Oil Spills and Discharges; 3.4.3.6.5 , Offshore Activities and Underwater Noise; 5.1.3, Past, Present, and Reasonably Foreseeable Future

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		Actions; 5.4, Gray Whales (Cumulative Impacts).
GV-16	12. Assess the Impact of military low frequency sonar on gray whales and their prey. This includes the expansive underwater ensonification grid in training areas off the coast of California and perhaps elsewhere.	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 3.4.3.6.5, Offshore Activities and Underwater Noise; 5.1.3, Past, Present, and Reasonably Foreseeable Future Actions; 5.4, Gray Whales (Cumulative Impacts).
GV17	13. Assess the effects and extent of bottom trawling of benthic habitat preferred by gray whales.	We considered known and potential human-caused impacts, but concluded this activity did not rise to a level that required consideration because it's been ongoing for decades and gray whales have recovered. We found no evidence suggesting bottom trawling affects gray whale foraging opportunities, nor does the comment point to any such evidence; there is no evidence that bottom trawling is likely to increase in the future.
GV18	14. Assess the threats to gray whale birthing lagoons in Mexico.	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to Subsection 5.1.3, Past, Present, and Reasonably Foreseeable Future Actions; 5.4, Gray Whales (Cumulative Impacts).
GV19	15. Assess the mortality rates in juveniles from Orca predation.	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 3.4.3.1.2, Global Distribution and Population Structure; 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem; 3.4.3.1.6, Natural Mortality; 3.5.3.1.1, ESA-listed Marine Mammal Species (Killer Whale); 4.5.2.2, Prey Availability; 5.1.3.8, Natural Mortality.
GV20	16. Assess the impacts of whaling in Washington State on tourism.	In response to this and related comments, we have updated relevant material in the new DEIS.

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		Refer to the following Subsections: 3.6.3.2.1, General Description of the Local Economy; 3.6.3.2.4, Contribution of Tourism to the Local Economy; 3.6.3.3.1, Summary of Economic Effects of the Makah Gray Whale Hunts; 3.6.3.3.2, Commercial Value of Whales; 3.8.3.3 Other Individuals and Organizations; 4.6.2.1, Tourism; 4.6.2.3, Whale-watching Industry; 4.6.3, Evaluation of Alternatives.
GV21	17. Assess the impacts of whaling in Washington coastal waters using a .50 caliber rifle on public safety.	In response to this and similar comments the new DEIS includes an “Offshore Hunt” alternative (Alternative 3); refer to the following subsections: 2.3.3, Alternative 3 (Offshore Hunt); 3.15, Public Safety; 4.15, Public Safety.
GV22	18. How will Makah whaling impact the PCFG whale population? What will the removal of resident whales have on ecosystems of their feeding sites in the Marine Sanctuary and the Straits? Their "plowing" action enhances habitat for benthic communities.	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 3.3.3.1 Pelagic Environment; 3.3.3.2 Benthic Environment; 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem; 4.3, Marine Habitat and Species.
GV23	19. Assess the impacts on whale watching communities along the West Coast, Canada and Mexico.	Refer to the following Subsections: 3.6.3.2.1, General Description of the Local Economy; 3.6.3.2.4, Contribution of Tourism to the Local Economy; 3.6.3.3.1, Summary of Economic Effects of the Makah Gray Whale Hunts; 3.6.3.3.2, Commercial Value of Whales; 3.8.3.3 Other Individuals and Organizations; 4.6.2.1, Tourism; 4.6.2.3, Whale-watching Industry; 4.6.3, Evaluation of Alternatives.
GV24	20. The US must maintain control and enforcement over all whaling activities of US citizens.	Refer to Subsection 1.2, Legal Framework.
GV25	21. There is no humane way to kill a whale. This hunt is unacceptably inhumane. ASW killing methods are recognized by the IWC as being even less efficient than those in commercial whaling operations. Longer times to death and lower instantaneous death rates are estimated, and higher 'struck and lost' rates are proven.	Refer to the following Subsections: 3.4.3.5, Welfare of Individual Whales; 4.4.2.5, Welfare

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		of Individual Whales - Method of Striking and Killing; Time to Death; Hunting Efficiency.
GV26	22. Whaling operations may cause stress and compromise welfare in the hunted whale even before a killing method Is deployed. Whalers depend on getting close to their quarry for successful harpooning. However, whales have not evolved as a prey species and may not be adapted to being chased. Pursuit times of 30 minutes or more are not unusual in Japanese hunts for example. The pursuit itself is believed to cause physical and psychological stress, which may lead to syndromes such as Exertional Myopathy, a condition that scientists believe may prove fatal, even to animals that evade capture. The DEIS must assess the stress impacts on gray whales during whale hunting. The stressful pursuit itself may lead to whales suffering or dying, even if they evade capture. We have witnessed extensive pursuit by the Makah in previous attempts to kill gray whales. These pursuits are "takes" under the MMPA.	Refer to the following Subsections: 3.4.3.5, Welfare of Individual Whales; 4.4.2.5, Welfare of Individual Whales - Method of Striking and Killing; Time to Death; Hunting Efficiency.
GV27	23. Social impacts - assess the impacts of Makah whaling on community tensions.	Refer to the following Subsections: 1.4.2, Summary of Recent Makah Whaling ─ 1998 through 2014; 3.8, Social Environment; 4.7 Environmental Justice.
GV28	24. The DEIS must include an analysis of the impact to other cetaceans if the Makah desire to hunt other species. The DEIS must explore and report Makah intent to hunt humpback whales.	Refer to the following Subsections: 1.2, Legal Framework; 1.3, Purpose and Need for Action; 1.4, Background and Context; 2.4.4, Hunt Other Marine Mammal Species Traditionally Hunted by the Tribe; 3.10.3.1, Makah Archaeological Resources Connected with Whaling; 3.10.3.4, Makah Historic Whaling; 3.17.3.1, Waivers of the MMPA Take Moratorium; 3.17.3.2, Worldwide Whaling; 4.5.2.1.1, Marine Mammals (Excluding Gray Whales); 4.17, Regulatory Environment Governing Harvest of Marine Mammals.
GV29	25. Diabetes - the Makah claim that eating whale would really help with the rampant diabetes in Neah Bay. A "medical" discussion about the cause and effect of dietary choices on diabetes as well as its management should be included. In the DEIS, this section should include any studies on the Makah diet, the abundance of readily affordable fresh fish and other seafood, the need for nutritional education that can mitigate diabetes in Neah Bay and how the dietary guidelines are common to all of us. A bad diet is a bad diet. The lack of whale meat and fat is not to blame.	Refer to the following Subsections: 3.16, Human Health; 4.16 Human Health.
GV30	26.Since the US government has a Federal Trust Responsibility to the Makah Tribe, the DEIS must assess the impact on human health to those who eat whale meat which on occasion may be toxic and pose severe	In response to this and related comments, we have updated relevant material in the new DEIS.

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	health risks. A contaminants testing program should be established to monitor any toxics load that may be present.	Refer to the following Subsections: 3.16, Human Health; 4.16 Human Health.
GV31	27. The Needs Statement - past EA's and DEIS and submissions to the IWC lack any written criteria for approving/disapproving a needs statement including the original Makah needs statement by Ann Renker. The DEIS should discuss the need for NOAA/NMFS to create specific criteria (verifiable statements, referenced data), and raw data that are published in the Federal Register for public comment and revision and <u>then</u> have the Makah submit a formal needs statement.	This is an area of active discussion by the IWC. At its 65th annual meeting the IWC passed a resolution (Resolution 2014-1) directing the aboriginal subsistence whaling (ASW) sub-committee to address a number of issues, including the development of standardized need statements and a better understanding of the relationship between needs and consumption patterns for ASW hunts. Subsection 1.4.1, Summary of Aboriginal Subsistence Whaling Catch Limits provides an overview of requests for ENP gray whales on behalf of the Makah as well as IWC plans to convene an aboriginal subsistence workshop in the near future to address ASW needs and related topics.
GV32	28. Require analysis of nutritional need per person and the yield from an average gray whale.	Refer to the following Subsections: 3.16, Human Health; 4.16 Human Health.
GV33	29. Government bias should be removed from DEIS in language and in "facts".	Comment noted.
GV34	30. Costs to taxpayers - we asked that the social Impacts include a close accounting of all government monies spent in the past (including enforcement by the Coast Guard) and anticipated in the future.	Refer to the following Subsections: 3.14, Public Services; 4.6, Economics; 4.6.2.5, Management and Law Enforcement.
GV35	We also request information on what steps the US Government has taken to inform Mexican and Canadian authorities and businesses of the proposed waiver given the ramifications to the whale-watching industries in those countries. There needs to be a clear notice to whale-watch operators along the entire West Coast of North America. Should you have any questions, feel free to contact Tamara Drake at (541) 552-0502. Sincerely, Will Anderson Green Vegans will@greenvegans.org Tamara Drake Green Vegans	The U.S. reports regularly to the 87 other member governments of the IWC (including Mexico). Although Canada withdrew from the IWC in 1982, the U.S. and Canada cooperate closely on a range of environmental issues and initiatives (e.g., both countries are founding members of the Arctic Council). While the U.S. is under no obligation to notify businesses in Mexico and Canada, information regarding waiver-related actions by the U.S. are readily available to all interested parties via federal

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	tami@greenvegans.org	portals (e.g., www.regulations.gov) and the media.

Humane Society of U.S. – Comments Submitted August 10, 2012 by N. Rose

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HSUS1	RE: Notice of Intent to Terminate the DEIS and Prepare a New EIS, NOAA–NMFS–2012–0104 Dear Mr. Stone: On behalf of the 11 million members and supporters of The Humane Society of the United States (HSUS), I am submitting scoping comments for the preparation of a new Environmental Impact Statement (EIS), required under the National Environmental Policy Act (NEPA), which will address the application by the Makah Tribe for a waiver of the Marine Mammal Protection Act (MMPA) prohibition on the take of marine mammals, to conduct a hunt for the Eastern North Pacific (ENP) gray whale (Eschrichtius robustus) in the Tribe's usual and accustomed fishing grounds. As we noted in our 2005 scoping comments, and note again here, the National Marine Fisheries Service (NMFS) is still referring to the Makah proposal as one in which the tribe seeks to "continue treaty right ceremonial and subsistence hunting of eastern North Pacific (ENP) gray whales" (p. 29967 of 77 FR 29967, emphasis added). With the exception of the highly contested whale hunts approved in 1999 and 2000, and later declared unlawful by two separate court rulings, as well as the illegal hunt of 2007, the Makah have not hunted whales in approximately 85 years. Therefore, the proposal more correctly concerns the Makah Tribe's interest in reviving its whaling tradition, a situation unique among aboriginal subsistence whaling (ASW) requests considered by the U.S. government or the International Whaling Commission (IWC) in the past. Indeed, The HSUS has opposed the Makah whaling proposal from the beginning because the request has never fit the definitions and requirements of domestic and international management regimes, will require a waiver under the MMPA, and creates a novel category of whaling at the international level that all too easily could be used by pro-whaling nations to justify killing more whales.	Comment noted
HSUS2	We agree that NEPA requires the NMFS to prepare a new EIS on the Makah's request for a waiver under the MMPA, given the scientific information that has become available since 2008. As addressed in greater detail below, in its new EIS the NMFS must consider, inter alia, new information from the IWC, a reasonable range of alternatives, a proper characterization of the past and present political situation, new scientific information regarding the two gray whale populations, and new scientific information regarding the effects on the whales from various anthropogenic threats and their cumulative impacts, as well as the effects of the proposed action on the welfare of individual animals, public safety, and certain federally protected areas. *Information from the IWC* The Federal Register notice indicated that the NMFS would consider discussions by the IWC Scientific Committee (SC) (p. 29968 of 77 FR 29967), which we agree is reasonable, but we emphasize the following, taken from the IWC's 2012 Scientific Committee Report:	The new DEIS has been updated with new information obtained since 2008. Information specific to the IWC's implementation review of PCFG gray whales can be found in Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity, and Related Estimates.

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	The Committee noted that the SLA variants tested did not correspond exactly to the management plan proposed by the Makah to the IWC [emphasis added]. The Committee agrees to test such a variant intersessionally and examine the results at the next Annual Meeting [in 2013 in South Korea]. In other words, the IWC SC's conclusion that there is an acceptable strike limit algorithm (SLA) for a hunt of the ENP gray whale on the Makah Tribe's usual and accustomed fishing grounds is not equivalent to a conclusion that the actual Makah whaling proposal is acceptable. The IWC SC must still test the SLA variant that corresponds to the Makah proposal and examine the results. As such, the NMFS must wait for the results of this 2013 examination and discussion before undertaking its environmental review in order to satisfy NEPA[1].	
HSUS3	In addition, the Federal Register notice indicates that the issue of Western North Pacific (WNP) gray whales possibly being taken in the Makah hunt will also be discussed in the new EIS (p. 29968 of 77 FR 29967). We fully support this intention and it is absolutely required under NEPA[2]. The IWC also noted its concern about this possibility, but again, its discussion on this issue has yet to be completed and will be continued at the 2013 meeting. Therefore, in order to conduct the requisite "hard look" required by NEPA, the NMFS must wait for the results of this 2013 discussion so that it can analyze this information in its environmental review[3].	Our analysis of WNP gray whales includes information provided by the IWC through 2014. Refer to the following Subsections: 2.3, Alternatives Considered for Detailed Study; 3.4, Gray Whales; 3.4.3.2, Western North Pacific (WNP) Gray Whales; 4.4.2, Evaluation Criteria (Gray Whales); 4.4.2.2, Change in Abundance and Viability of WNP Gray Whales; 4.4.3, Evaluation of Alternatives; 5.4, Gray Whales (Cumulative Effects).
HSUS4	*Alternatives* The Federal Register notice suggests the following alternatives (p. 29968 of 77 FR 29967): Alternative 1: No action Alternative 2: Tribe's proposed action Alternative 3: Offshore hunt Alternative 4: Summer-only hunt, to avoid taking WNP gray whales Alternative 5: Adaptive management hunt We are pleased to see the addition of Alternatives 3 and 5. The HSUS noted in its 2008 DEIS comments that Alternative 3 should have been included as one of the alternatives considered, and we will be pleased to see its inclusion in the new EIS. However, as we did in our 2005 scoping comments, we still recommend the inclusion of a sixth alternative, a "Ritual hunt," which relies on "calling a whale" to shore – a cultural practice historically performed by the Makah chiefs that does not result in the death of a whale. Such an alternative encompasses Makah traditions and should be thoroughly discussed in the new EIS[4]. In addition, while the NMFS has proposed Alternative 4 to decrease the likelihood that a WNP gray whale will be taken, it increases the risk that a Pacific Coast Feeding Group (PCFG) whale will be taken, and the effects of such must be properly analyzed in the new EIS[5].	We included the suggested "ritual hunt" in this DEIS (Subsection 2.4.1, Non-lethal Hunt) and for the reasons described in that Subsection did not analyze it in detail. In response to this and other comments, we included a "Split Season" hunt alternative (Alternative 5) to address concerns that a tribal hunt should be managed to avoid WNP whales while still minimizing the chance of taking a PCFG whale; refer to Subsection 2.3.5, Alternative 5 (Split-season Hunt).
HSUS5	*Characterization of the past and present political situation*	Refer to the following Subsections: 1.2, Legal Framework; 1.3, Purpose and Need for Action;

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	The 2008 DEIS, as with previous NEPA documents prepared on the Makah whaling proposal, inaccurately described the political and administrative background of the Makah's effort to resume whaling. Indeed, as noted in our comments on the 2008 DEIS, The HSUS has opposed the Makah hunt proposal from the outset because it did not conform to international standards of aboriginal subsistence whaling. The proposal threatened to create (and has indeed de facto created) a new category of whaling – cultural whaling – that does not reflect a true subsistence need. We strongly recommend that the new EIS accurately reflect the history of the Makah whaling proposal at the IWC, as carefully outlined in our 2008 DEIS comments.	1.4, Background and Context; 1.6, Relationship to Other Treaties, Laws, Regulations, Policies, and Processes.
HSUS6	*New science* The Federal Register notice appears to have covered the major areas of new research results and indicates that the new EIS will include a comprehensive and fair discussion of this work (p. 29968 of 77 FR 29967). This new research includes studies indicating that the PCFG may warrant consideration as a separate management unit. We believe the evidence is now sufficient to treat the PCFG as a separate management unit and the new EIS must be approached with this as the starting point. However, the new EIS should also include other work, such as the genetic analysis by Alter et al. (2007)6, which noted that the historic population of ENP gray whales may have been larger than is currently the conventional wisdom. The 2008 DEIS did mention this paper and indicated further work on its analysis was needed. If such further analysis has not been completed, the NMFS should undertake it before completing a new EIS. Indeed, without an adequate understanding of the relationship between the current ENP gray whale population estimate and its historic numbers, the NMFS cannot establish a proper environmental baseline from which to analyze the environmental impacts of the proposed action and thus cannot comply with NEPA[7].	Refer to the following Subsections: 3.4.3.1.3, Population Exploitation, Protection, and Status; 3.4.3.3.1, ENP Population Structure; 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates; 3.4.3.4.4, PCFG Status, Carrying Capacity, and Related Estimates.
HSUS7	The new EIS should also include a thorough discussion of the potential and already-measured impacts of climate change on the ENP gray whale and its Arctic habitat and should include reference to the growing body of research on this topic. The 2008 DEIS did not even mention climate change in any substantive way until Chapter 5 and even then it was covered in only two paragraphs. The review of the threats facing the ENP gray whale in Chapter 3 did not have a separate discussion on climate change at all. The new EIS should include a thorough discussion of climate change impacts[8]. The new EIS should also thoroughly consider the cumulative impacts on the ENP gray whale from climate change, chemical and noise pollution, harmful algal blooms, and increased shipping in the Arctic, as well as other threats adversely affecting the species, as required by NEPA[9]. The science of cumulative impact analysis is advancing and the new EIS should reflect these advances.	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 3.4.3.6, Known and Potential Anthropogenic Impacts; 3.11, Noise; 5.1.3, Past, Present, and Reasonably Foreseeable Future Actions; 5.4, Gray Whales.
HSUS8	The new EIS should also include any results, conclusions, and insights that arose as a result of the 2012 ENP gray whale stock assessment and the related discussions by the Pacific Scientific Review Group in late 2011 (and any subsequent discussions that are more recent when the new EIS is drafted).	Refer to Subsection 3.4.3.3, Eastern North Pacific (ENP) Gray Whales.
HSUS9	*Public safety*	Refer to the following Subsections: 1.4.2, Summary of Recent Makah Whaling ─ 1998

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	The 2008 DEIS failed to adequately clarify how those responsible for managing the hunt will prevent on-water interactions between whalers, officials (e.g., the Coast Guard), and protesters from becoming dangerous. The new EIS must clarify and carefully discuss how public safety will be maximally protected during a hunt. In a related point, the 2008 DEIS did not adequately address the ramifications of the illegal hunt that occurred in 2007. This hunt had ramifications for public safety, enforcement of any part of the Makah whaling management plan, and the PCFG. The new EIS should thoroughly discuss the breakdown in security and process that allowed this hunt to happen using the official whale hunting firearm and what ramifications this breakdown might have for any future monitoring of the hunt, enforcing the regulations, and public safety.	through 2014; 3.15, Public Safety; 4.15, Public Safety.
HSUS10	*Welfare* Whenever NMFS issues a take permit pursuant to the MMPA, the permit "shall" specify "the location and manner (which manner must be determined by the Secretary to be humane)"[11] of take [12]. Yet the 2008 DEIS did not adequately consider the impact of hunting methods on individual animals or whether those methods are humane. We strongly urge the NMFS to include a thorough discussion of this aspect of the hunt in the new EIS, taking into account information presented over the years at the IWC, in its working group on whale killing methods and related animal welfare issues, and relevant information that has come from the bowhead hunt in Alaska. In particular, the NMFS must discuss the pain and suffering the hunt will cause individual animals, as well as a full analysis of which whaling method – if any – can be deemed "humane" under the MMPA.	Refer to the following Subsections: 2.4.6, Employ Different Hunting Methods; 3.4.3.5, Welfare of Individual Whales; 4.4.2.5, Welfare of Individual Whales - Method of Striking and Killing; Time to Death; Hunting Efficiency.
HSUS11	*Federally protected areas* We note that the Federal Register notice states that "marine habitat and species," "other wildlife species," "public services," and the "national regulatory environment" will be considered in the new EIS, but does not specifically list how the hunt will affect wilderness and other federally-designated protected areas (p. 29968-9 of 77 FR 29967). We noted in our comments on the 2008 DEIS that such a discussion was lacking and urge the NMFS to include such a discussion in the new EIS. For example, we note that the hunt is proposed in or near federally-designated protected areas, including the Olympic Coast National Marine Sanctuary; the Washington Islands National Wildlife Refuges, including the Quillayute Needles, Flattery Rocks, and Copalis Refuges, which are almost entirely designated as Wilderness Areas; the Olympic National Park; and the Olympic Biosphere Reserve. The NMFS must fully account for any possible effects the proposed hunt will have on the values intended to be protected by these areas[13].	Refer to the Section 3, Affected Environment (especially Subsection 3.1.1, Designated Areas) as well as Section 4, Environmental Consequences.
HSUS12	*Conclusion* The NMFS's prior efforts to promote and approve the Makah request have consistently resulted in legal short cuts and questionable policy positions that have weakened domestic and international whale protection. Indeed, the government has been so anxious to get to the finish line – to approve the Makah request – that it has repeatedly bent and broken the rules. The HSUS hopes that this will not be the case with	Comment noted.

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	the new EIS, and that the NMFS will adequately consider all relevant information, including the information described above, in order to properly analyze the environmental implications of granting the Makah's waiver request, as required by NEPA and its implementing regulations. Thank you for the opportunity to provide these scoping comments. Sincerely, Naomi A. Rose, Ph.D. Marine Mammal Scientist The Humane Society of the United States Cc: Timothy Ragen, Ph.D., executive director, Marine Mammal Commission [1]See 40 C.F.R. § 1500.1(a), which states that NEPA evaluation must insure relevant environmental information is made available to government officials and the public "before decisions are made and before actions are taken" and that such information include "[a]ccurate scientific analysis" (emphasis added). [2]See 40 C.F.R. §§ 1508.8; 1508.27(b)(9), which states that both direct and indirect impacts must be analyzed under NEPA, including the effects on natural resources and components of affected ecosystems, and the effects on threatened and endangered species. [3]See Robertson v. Methow Valley Citizens, 490 U.S. 332, 349-50 (1989). This ruling noted that NEPA's "hard look" requirement "ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed to the die otherwise cast." [4]See e.g., 40 C.F.R. § 1502.14(a), which states that NEPA requires agencies to "rigorously explore and objectively evaluate all reasonable alternatives." See also the ruling in Nat. Resources Defense Council v. Callaway, 524 F 2d. 79, 93 (2nd Cir. 1975), wherein it states that NEPA requires an agency to "consider such alternatives to the proposed action as may partially or completely meet the proposal's goal." [5]40 C.F.R. § 1502.14(a) [6]Alter S.E., Rynes E., and Palumbi S.R. 2007. DNA evidence for historic population size and past ecosystem impacts of gray whales Proc. Natl. Acad. Sci. USA 104:15162-15167. [7]See Half Moon Bay Fishermans' Mktg. Ass'n v. Carlucci, 857 F.2d 505, 510 (9th Cir.1988), which states that "[w]ithout establishing…baseline conditions…there is simply no way to determine what effect [an action] will have on the environment and, consequently, no way to comply with NEPA." [8]See e.g., Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172, 1217 (9th Cir. 2008), which notes that relevant impacts related to climate change must be considered in NEPA analyses. [9]See 40 C.F.R. § 1508.7, which states that, in its cumulative impacts analysis, an agency must consider impacts that "result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." [10]See 40 C.F.R. § 1508.27, which states that listing "significant" environmental effects must be explained, including "[t]he degree to which the proposed action affects public health or safety."	

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	[11]The MMPA defines "humane" as "that method of taking which involves the least possible degree of pain and suffering practicable to the mammal involved" (16 U.S.C. § 1362(4)). [12]16 U.S.C. § 1374(b)(2)(B) (emphasis added). [13]See 40 C.F.R. § 1502.16(c), which states that NEPA requires an agency to fully address "[p]ossible conflicts between the proposed action and the objectives of Federal…policies and controls."	

J. Public - Comments Submitted May 27, 2012

COMMENT CODE	COMMENT	RESPONSE
JP1	the makah tribe needs to stop killing whales. what existed in this world in l700 or some such previous time does not mean it can continue in 2012. we live in a world where such species are under extreme stress. they are killed by ships, by commercial fish profiteers who say they eat fish so they want them dead, etc. its time to stop the killing of whales by everybody in america. everybod. the makah tribe needs to move into 2012. the whales zre gone for everybody. nobody should be killing them any more.	Comment noted.

Marine Mammal Commission– Comments Submitted August 27, 2012 by T. Ragen

COMMENT CODE	COMMENT	RESPONSE
MMC1	Dear Mr. Stone: The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the National Marine Fisheries Service's 21 May 2012 notice (17 Fed. Reg. 29967) regarding a draft environmental impact statement on the Makah Tribe's proposal to take gray whales for ceremonial and subsistence purpose. The Service's notice indicates that it intends to terminate its .review of a prior draft statement and prepare a new one. The Commission offers the following recommendations and rationale. RECOMMENDATIONS The Marine Mammal Commission recommends that the National Marine Fisheries Service- • publish a new draft environmental impact statement on the proposal to authorize whaling by the Makah Tribe under the Marine Mammal Protection Act • retain sufficient flexibility in its NEP A process to respond to new information or changed circumstances (e.g., by issuing supplemental analyses if needed) • either not include an adaptive management alternative in the draft environmental impact statement or, if such an alternative is included, provide an explanation of how it would be consistent with the procedural requirements of the Marine Mammal Protection Act and describe what, if any, procedural safeguards it would build into its management regime to ensure that parties to the rulemaking are ongoing participants in post-rulemaking decisions • add to the environmental impact statement an alternative that includes both temporal limits on the hunting season to avoid times when either feeding-group whales or western stock whales are most likely to be present, and • discuss in the new draft environmental impact statement the implications of the *Kokechik* decision for the rulemaking in the Makah Tribe's request for a waiver.	Comments noted and addressed below.
MMC2	RATIONALE New information More than seven years have passed since the Makah Tribe first submitted its application seeking a waiver of the Marine Mammal Protection Act's taking moratorium so that it could hunt gray whales for ceremonial and subsistence purposes. Thus, the Commission does not take lightly the idea of recommending that the National Marine Fisheries Service now set aside its previous draft environmental impact statement on this action and begin the NEP A review process anew. Nevertheless, doing so appears to be the best course of action to ensure that the Service meets its responsibilities under that Act. A new analysis is warranted because understanding of gray whale movements along the Pacific coast of the United States has changed materially since publication of the original draft statement. Two findings are particularly noteworthy and require consideration by the Service. First, recent genetic studies indicate that the Pacific Coast Feeding	The new DEIS has been updated to reflect the new information described in these comments.

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<tr><th>COMMENT CODE</th><th>COMMENT</th><th>RESPONSE</th></tr>
<tr><td></td><td>Group may be sufficiently distinct to merit consideration as a separate stock or management unit. Second, satellite telemetry, photo-identification, and genotype studies have revealed the occurrence of gray whales from the endangered western Pacific stock in U.S. west coast waters, where they become part of the migratory stream of gray whales along the coast between Alaska and Mexico. The Service could consider these issues in a supplemental draft environmental impact statement, but a new document would make it easier for the Service to describe the implications of these findings to the Makah Tribe, conservation organizations, and the public and thereby enable them to comment more meaningfully. Therefore, the <u>Marine Mammal Commission recommends</u> that the National Marine Fisheries Service publish a new draft environmental impact statement on .the proposal to authorize whaling by the Makah Tribe under the Marine Mammal Protection Act</td><td></td></tr>
<tr><td>MMC3</td><td>Continued uncertainty

The implications of the new information on the Pacific Coast Feeding Group and the mixing of western and eastern Pacific gray whales remain uncertain, but likely will require some adjustments to current scientific assessments and management strategies. For example, the International Whaling Commission's Scientific Committee noted in the report from its 2012 meeting that the strike limit algorithm variants that it tested to support issuance of a new aboriginal subsistence whaling catch limit for gray whales "did not correspond exactly to the management plan proposed by the Makah to the IWC." Thus, the Committee agreed to test a variant that did match the Tribe's management plan at its 2013 meeting.

The 2012 report also notes the Scientific Committee's concern "about the possibility of whales feeding in the Western North Pacific being taken during the proposed Makah Tribe hunt in northern Washington." Among the issues identified by the Committee were-
the need to estimate the probability of a western gray whale being taken in aboriginal hunts for gray whales
the possibility that research results may indicate the need for further testing of strike limit algorithms, and
the need to continue monitoring this situation and conduct additional analyses as the International Whaling Commission requests.
The Committee noted that research was ongoing to investigate the riming, routes, and destinations of migrations by western Pacific gray whales and the resulting management implications. It noted the need for such research before drawing conclusions about the possible effects of the Makah hunt on the western Pacific gray whale stock. It plans to consider these matters again at its 2013 meeting.

Because of the remaining uncertainty regarding the potential effects of the Makah hunt on both the Pacific Coast Feeding Group and the endangered western Pacific gray whale stock, <u>the Marine Mammal Commission recommends</u> that the National Marine Fisheries Service retain sufficient flexibility in its NEPA process to respond to new information or changed circumstances (e.g., by issuing supplemental .analyses if needed).</td><td>In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 3.4, Gray Whales; 3.4.3.2, Western North Pacific (WNP) Gray Whales; 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales; 4.4.2, Evaluation Criteria (Gray Whales); 4.4.2.2, Change in Abundance and Viability of WNP Gray Whales; 4.4.3, Evaluation of Alternatives; 5.4, Gray Whales (Cumulative Effects).</td></tr>
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MMC4	Alternatives The Service's notice identified five alternatives that it may include in a new draft environmental impact statement Alternative 5 is the adoption of an adaptive management strategy to govern the hunt. Generally, the Commission supports adaptive management strategies that allow managers to monitor the effectiveness of conservation programs, learn as they go, and refine regulatory mechanisms in response. As indicated above, the Commission also believes that the Service should maintain some flexibility for meeting its NEP A responsibilities, which are intended to ensure that decision-makers and the public are well-informed about the consequences of possible alternative actions. However, the Makah Tribe is seeking to waive the Marine Mammal Protection Act's taking moratorium and an adaptive management process may require more flexibility than can reasonably be accommodated under a waiver. Indeed, Congress provided a number of checks on the waiver process, including increased scrutiny of waiver decisions under the Marine Mammal Protection Act, a heightened evidentiary burden under the Administrative Procedure Act, and the opportunity for interested parties to make their case before an independent decision-maker as to whether the requirements of the Marine Mammal Protection Act have been met fully. Allowing the Service regulatory flexibility to adjust the management regime in potentially fundamental ways-but outside the scope of the formal rulemaking process--poses various problems. It suggests that the Service may not be confident that it has sufficient information to meet the rigorous standards of the Act at the outset, but rather would offer a speculative guarantee that, if a waiver is granted, it will ensure that those standards are met through its post-rulemaking management decisions. In essence, this approach runs the risk that interested parties will be excluded from the decision-making process in ways not envisioned by the Marine Mammal Protection Act or the Administrative Procedure Act. If an adaptive management approach is included in the draft environmental impact statement as one of the alternatives, the Marine Mammal Commission recommends that the National Marine Fisheries Service explain how it would be consistent with the procedural requirements of the Marine Mammal Protection Act and describe what, if any, procedural safeguards it would build into its management regime to ensure that parties to the rulemaking will be able to participate in post-rulemaking decisions.	The new DEIS describes an action alternative (Alternative 6) where the waiver of the take moratorium would expire 10 years after adoption and regulations governing the hunt would limit the term of any hunt permit to not more than 3 years. Limiting the permit term to 3 years provides an opportunity for more frequent NMFS review than if permits were issued for 5 years. After 10 years a new waiver process would need to be initiated if the tribe chose to continue whaling. Refer to the following Subsections: 1.2, Legal Framework; 2.3.6, Alternative 6 (Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits); 4.4.3.6, Alternative 6, Different Limits on Strikes and PCFG, and Limited Duration of Regulations and Permits.
MMC5	Two of the five alternatives have temporal limitations that, based on what we know at this point, are designed to avoid taking whales from either the Pacific Coast Feeding Group (the Tribe's proposed action) or the western Pacific stock (the summer-only hunt). Another alternative also should be analyzed-a combination of those two alternatives that would limit the hunting season to avoid times when either the Pacific Coast feeding group whales or western Pacific stock whales are most likely to be present. To address both concerns, the Marine Mamma1 Commission recommends that the National Marine Fisheries Service add to the environmental impact statement an alternative that includes both temporal limits on the hunting season to avoid times when whales of either the Pacific Coast Feeding Group or the western Pacific stock are most likely to be present. In developing this alternative (and in assessing the original two alternatives) the Service will need to account for the considerable uncertainty regarding the movement patterns of these two whale groups.	In response to this and similar comments, we have included a "Split Season" hunt alternative (Alternative 5) to address concerns that a tribal hunt should be managed to avoid WNP whales while still minimizing the chance of taking a PCFG whale; refer to Subsection 2.3.5, Alternative 5 (Split-season Hunt). Recognizing the need to account for the uncertainty described in this comment, this alternative has the most constrained hunting season (44 days split

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		between two hunt periods) of all the action alternatives.
MMC6	*The Kokechik decision* Finally, the Service may find itself able to authorize the taking of whales from some groups, but not others. Such a finding will depend on (1) resolution of the stock identity questions related to the Pacific Coast Feeding Group and the whales that spend some time in both the western and the eastern Pacific, and (2) the information available to make optimum sustainable population determinations fur the whale groups whose members may occur in Washington waters. Such an outcome would be similar to that faced in *Kokechik Fisherman's Association* v. *Secretary of Commerce*, 839 F.2d 795 (1988), in which the Service determined that it could issue a taking authorization for some marine mammal species and stocks, but not others. In that case, the court of appeals indicated that "the Act may not prohibit issuance of a permit where there is only a very remote possibility that marine mammals for which an optimum sustainable population has not been determined may be taken ...." However, in the *Kokechik* case, the court ruled that no taking could be authorized for any marine mammal stock because of the virtual certainty of taking marine mammals from stocks for which an optimum sustainable population determination could not be made. To address the possibility of taking a whale from the Pacific Coast Feeding Group or the western Pacific stock, <u>the Marine Mammal Commission recommends</u> that the National Marine Fisheries Service discuss in the new draft environmental impact statement the implications of the: *Kokechik* decision for the rulemaking in the Makah Tribe's request for a waiver. The Service should discuss (1) whether it intends to treat the Pacific Coast Feeding Group and/ or the western Pacific gray whales that migrate to the eastern Pacific Ocean as separate stocks, (2) whether it believes that it will be able to make an optimum sustainable population determination for either of those putative stocks, (3) how it will judge the likelihood of taking whales from either of those putative stocks, and (4) whether it believes that authorizing the taking of migratory gray whales along the Washington state coast is consistent with the ruling in *Kokechik* if authorizations cannot be issued for gray whales from the putative stocks that also might be in the area. Thank you for the opportunity to comment. The Commission looks forward to further discussions with the Service about these matters. Sincerely, Timothy J. Ragen, Ph.D Executive Director	The purpose of the analysis in the DEIS is not to assert legal opinions or conclusions but to predict likely effects on the human environment of the Makah Tribe's proposed action and the alternatives. Our assessment of North Pacific gray whale stocks, including the likelihood of taking whales from them, can be found in the following Subsections: 2.3.5, Alternative 5 (Split-season Hunt); 3.4, Gray Whales; 3.4.3.2, Western North Pacific (WNP) Gray Whales; 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales; 4.1.1 through 4.1.6, [Environmental Consequences] Alternatives 1 through 6; 4.4.3, [Gray Whales] Evaluation of Alternatives.

Peninsula Citizens for Protection of Whales – Comments Submitted August 8, 2012 by M. Owens

COMMENT CODE	COMMENT	RESPONSE
PCPW1	Greetings, Donna Darm and Steve Stone- These comments are being submitted to the current Makah whaling DEIS process, and are intended to be added to the comments already submitted by Peninsula Citizens for the Protection of Whales to the past DEIS. The concerns we had then, we continue to have. And new issues just keep piling on. Thankfully, this whaling was halted in the years between 1999 and now. Had Makah whaling gone forward under any of the management scenarios put forward by the Tribe and NOAA, we could easily have lost the small population of gray whales that feed off Washington's coast in the Makah U&A. At the rate of [20] gray whales every five years, that could have been at least [55] whales gone by this year. And this does not take into account the "struck and lost" numbers allowed. How many would have been resident whales? Even at a previously recommended "one a year", a loss of 13 adults from this small group would have been devastating. If six had been females, the loss multiplies for generations. The fascinating implications of the new DNA science regarding resident whales would have been left incomplete, or sadly moot, with the eventual elimination of these whales. What a loss to science and to the local ecosystem that would have been! NOAA scientists would have assured us that "other whales" would quickly fill the places of the "so called residents". Now we know how unlikely that would have been. We can only hope that NMFS enters into this new effort without a foregone conclusion, and with a determination to do a truly thorough and honest assessment of the issues that will determine the very survival of the special gray whales that frequent the waters of Washington State. However, after all these many years of scrutinizing your work and watching your flawed conclusions overturned in court, we can be forgiven for being skeptical. And our members wonder if it is even calculable how much money has been flushed down the toilet on this whole ill-conceived quest. With that said, we now start, with you , a new chapter...a fresh chance to analyze new findings...to ask new questions...to renew hope that the poor old Precautionary Principle can be dusted off and used to protect what is precious.	Comments noted.
PCPW2	Topics of concern not covered in past PCPW comments: - The new verification of genetic differences between the "resident whales" and the migrating population of Eastern Pacific gray whales raises many questions. - How will these whales be classified? Distinct population segment? - With or without a new classification, is NOAA committed to more careful management of this Washington Coast/ Southern Vancouver Island subgroup of the "PCFG"?	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 3.4, Gray Whales (especially Subsection 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales; 4.1.1 through 4.1.6, [Environmental Consequences] Alternatives 1 through 6; 4.4.3, [Gray Whales] Evaluation of Alternatives.
PCPW3	- With new appreciation for the vital role the mothers play in passing their unique feeding knowledge to their calves, will there be heightened protection from harassment for the cow-calf pairs in the spring and summer and fall months? How will this be accomplished?	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 1.2.4.1.3, IWC Aboriginal Subsistence Whaling; 1.2.4.2.3,

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		National Aboriginal Subsistence Whaling; 2.3.2, Alternative 2 (Tribe's Proposed Action); 2.3.3, Alternative 3 (Offshore Hunt); 2.3.4, Alternative 4 (Summer/Fall Hunt); 3.4.3.3.1, ENP Population Structure; 3.4.3.4.1, PCFG Population Structure; 4.4, Gray Whales.
PCPW4	- With off-shore feeding techniques being one of the hallmarks of resident whale "culture", how can NMFS contemplate an off-shore summer hunt? This would target resident whales for death and harassment at the very time and place that the mothers are passing to their calves the knowledge that makes them unique. The very knowledge that may have allowed the Eastern Pacific gray whales to survive the Ice Age. The very learned feeding habits that could save the species in the future. When catastrophe strikes the near-shore habitat, only those who can feed off -shore will thrive. The percentage of the Eastern gray whale population that has this knowledge may be as low as 1%.[200 out of 20,000] A very important 1%, with only a fraction of that number specialized for the Washington coast. How can NMFS contemplate a "take" from this tiny group?	The DEIS includes only one alternative (Alternative 4) that contemplates hunting during the summer. That alternative is not restricted to offshore waters but instead has the same hunt area as the tribe's proposal (Alternative 2). Refer to the following Subsections regarding Alternative 4 and gray whale feeding strategies: 2.3.4, Alternative 4 (Summer/Fall Hunt); 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem; 3.4.3.3.2, ENP Seasonal Distribution, Migration, and Movements; 3.4.3.3.4, ENP Status, Carrying Capacity, and Related Estimates; 3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales; 4.1.4, Alternative 4, Summer/Fall Hunt; 4.4.2.1, Change in Abundance and Viability of the ENP Gray Whale Stock.
PCPW5	-Has NMFS attempted to calculate how many resident whales can be supported in the Makah U&A eco-system? Is the population rising? falling? remaining the same? Can this be explained?	Refer to the following Subsections: 3.4.3.4.1, PCFG Population Structure; 3.4.3.4.2, PCFG Seasonal Distribution, Migration, and Movements; 3.4.3.4.3, PCFG Abundance and Trends; 3.4.3.4.4, PCFG Status, Carrying Capacity, and Related Estimates.
PCPW6	-Will the IWC need to re-assess the "20 whales every five years quota" in light of new information about genetic distinctiveness of resident whales, if they will be the allowed targets of a hunt?	Refer to Subsection 3.4.3.4.4, PCFG Status, Carrying Capacity, and Related Estimates - IWC Implementation Review of PCFG Gray Whales.
PCPW7	- There have been anecdotal reports of cooperative feeding among groups of gray whales encircling and lunge-feeding on forage fish off-shore. What does NMFS know about this?	We are not aware of the anecdotal reports cited. Refer to the following Subsections regarding gray whale feeding strategies: 3.4.3.1.4, Feeding Ecology and Role in the Marine Ecosystem;

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		3.4.3.4, Pacific Coast Feeding Group (PCFG) of Gray Whales.
PCPW8	-The new finding that unknown numbers of Western gray whales transit through Washington waters in the fall-winter-spring, possibly mingling with resident whales at their feeding grounds, as well as mixing in with the main migration to Baja raises new questions. -Will this finding rule out spring-fall-winter hunts, or is NMFS prepared to allow an accidental take by death or harassment of a Western gray to accommodate a Makah hunt? -Will the IWC need to weigh in on any plan that could threaten a Western gray?	In response to this and related comments, we have included WNP gray whales in our analysis in the new DEIS. Refer to the following Subsections: 2.3, Alternatives Considered for Detailed Study; 3.4, Gray Whales; 3.4.3.2, Western North Pacific (WNP) Gray Whales; 4.4.2, Evaluation Criteria (Gray Whales); 4.4.2.2, Change in Abundance and Viability of WNP Gray Whales; 4.4.3, Evaluation of Alternatives; 5.4, Gray Whales (Cumulative Effects).
PCPW9	- Tsunami debris is already accumulating on every beach between Cape Flattery and La Push. Surveyors have kayaked this coastline and found no beach untouched, and some beaches that resemble landfills. The main tonnage is yet to arrive. This raises serious questions, some of which involve gray whales. -There is no doubt that masses of rubbish and toxic materials will arrive at the coast soon and for years to come. There is no plan in place to systematically remove this dangerous material. The effect this will have on the rocky headlands and sandy shores is not known, but must be contemplated. As the junk sloshes in and out, the tidal and near-shore habitats will surely be impacted. How will this affect the gray whales' feeding areas? They may be sickened and harmed from ingesting rubbish. They may be disoriented by the changes and danger in their familiar feeding grounds. Off-shore feeding may become a necessity rather than a choice. It would be extremely inhumane to interject an off-shore hunt into this stressful scenario. Does NMFS have a plan in place to monitor the extent and effects of submerged trash and toxins on the benthic species and the food web they support?	Refer to the following Subsections: 3.4.3.6.2, Environmental Contaminants; 3.4.3.6.12, Marine Debris.
PCPW10	- NOAA is well aware of the current problem of ocean acidification on the Pacific Northwest Coast. It is well documented that the Makah U&A is sandwiched between at least two commercial oyster growers who can no longer raise oyster larvae in local waters due to the changing chemistry in the near-shore. [see attached Seattle Times article by Craig Welch.] - What monitoring is NOAA doing in the Marine Sanctuary related to acidification? - What is the most up to date assessment of the health of shell-forming organisms on the coast? - What is NOAA's projection of how the changes in water chemistry will affect the naturally occurring populations of shell bearing organisms and the food web that depends on them? - For this DEIS NOAA must extrapolate the inevitably detrimental effects that increased acidification will likely have on gray whales, and explain what NOAA intends to do to mitigate this huge problem. Off-shore feeding/teaching behaviors will be critically important. Is NOAA committed to protecting gray whales engaged in this activity?	In response to this and related comments, we have included WNP gray whales in our analysis in the new DEIS. The DEIS includes only one alternative (Alternative 4) that contemplates hunting during the summer. That alternative is not restricted to offshore waters but instead has the same hunt area as the tribe's proposal (Alternative 2). Refer to the following Subsections regarding Alternative 4 and ocean acidification: 2.3.4, Alternative 4 (Summer/Fall Hunt); 3.4.3.6.11, Climate Change and Ocean Acidification; 4.1.4, Alternative 4, Summer/Fall

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	- How would a summer off-shore hunt impact the feeding and passing of knowledge to the new generation each year?	Hunt; 5.2, Water Quality (Cumulative Effects); 5.3, Marine Habitat and Species (Cumulative Effects); 5.4, Gray Whales (Cumulative Effects); 5.5, Other Wildlife (Cumulative Effects).
PCPW11	The scope and severity of the issues touched upon above require a new alternative. PCPW requests the addition of an alternative that responds to the new realities of life on Washington's outer coast. Rather than a "do nothing" alternative, there must be an alternative that decrees a moratorium on any hunting of gray whales by the Makah Tribe anywhere in their U&A.	Refer to Subsection 2.4, Alternatives Considered but Eliminated from Detailed Analysis.
PCPW12	The Tribe has a unique opportunity to call a halt to this current DEIS process. With leadership from the Makah Tribe, many tribes have rightly proclaimed alarm at the effects of global warming now being felt across the nation and the world. In these times of tight budgets, it would seem logical and imperative that all attention and resources be directed at the big problem: ocean acidification. For if no solution is found, if the sources of the environmental degradation are not confronted with strength, the shellfish are doomed, the salmon are doomed, the whales are doomed, and we are doomed. There is nothing to pass to the next generations but regret and sorrow. Does the Tribe "fiddle while Rome burns" with this energy, money, attention, time, emotion, and ally draining pursuit of whaling? Or does the Tribe decide to commit every effort towards fighting to save the sea life of this home we all love? There would be such respect for this decision, and so many allies in the "battle." We can only hope that NOAA, an agency tasked with stewardship of our oceans, would agree. Thank you for taking these comments into consideration, Margaret Owens Peninsula Citizens for the Protection of Whales Port Angeles, Washington [attachment] Originally published June 21, 2012 at 9:24 PM | Page modified June 22, 2012 at 1:34 PM Willapa Bay oyster grower sounds alarm, starts hatchery in Hawaii A Willapa Bay shellfish company is shifting some of its business to Hawaii because of ocean acidification that scientists believe is killing tiny oyster larvae in shellfish farms along Washington's coast. By Craig Welch THE SEATTLE TIMES The owners of Goose Point Oysters have been raising oysters in Willapa Bay since the mid-1970s but recently opened a hatchery in Hawaii because ocean acidification made it harder to raise oysters in the	Comments and attachment noted.

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	Northwest. After 34 years rearing shellfish in Willapa Bay, Dave Nisbet was in a bind: Nature had stopped providing. Oysters were no longer reproducing naturally on the Washington Coast. Oyster larvae were even dying in nearby hatcheries, which use seawater to raise baby shellfish that get sold as starter seed to companies like Nisbet's Goose Point Oysters. But when, in 2009, Nisbet heard oceanographers identify the likely culprit — increasingly corrosive ocean water, a byproduct of the same greenhouse gases that contribute to global warming — the oysterman did the unthinkable. Nisbet took out a loan and spent three years testing and building a new hatchery that opened recently. In Hawaii. Most of Washington's $100 million-a-year oyster industry has been whipsawed in recent years by ecological problems. But Nisbet's oyster company appears to be one of the first businesses in the Northwest — perhaps anywhere — to shift part of its business to a new region in response to ocean acidification. "I just got nervous," Nisbet said. "I was afraid if I didn't do something, then our business would just slowly die." Now, rather than relying on oysters that have spawned in Willapa Bay or on juvenile oysters purchased from a nearby hatchery — as he has for years — Nisbet raises larvae in tanks in a million-dollar, 20,000-square-foot plant in Hilo, Hawaii. The tiny larvae are then sent by mail to Washington, where Nisbet and his team oversee the rest of the multiyear growing cycle in Willapa Bay. "It would have been much easier and cheaper to start a hatchery here," Nisbet said. "But we just saw the hatcheries having failures, the larvae dying in the tanks and just decided to sidestep the issue completely." Nisbet's move is just the latest sign of how the threat of ocean acidification is altering the way Washington's shellfish growers do business. Changes come fast Scientists for years have warned that excess carbon dioxide from the burning of fossil fuels eventually would be taken up by marine waters and begin lowering the pH of the world's oceans. In the last five years, oceanographers at the National Oceanic and Atmospheric Administration (NOAA) working along the U.S. West Coast repeatedly have documented that ocean chemistry is already changing, decades earlier than anyone predicted. Scientists are still learning just how those changes ultimately may upend marine food webs. Researchers have shown that less-alkaline seawater causes sea urchin larvae to change shape, makes squid more lethargic and prompts clown fish to race toward rather than away from predators. But the type of calcium carbonate used by juvenile oysters during the initial stage of forming their shells is particularly vulnerable to even slight increases in acidity. And the dark, frigid water that wells up from the deep along the Northwest coast during north winds already is naturally richer in carbon dioxide than most ocean surface water. Those natural conditions combined with greenhouse-gas emissions, scientists reported earlier this year, have turned the tidal currents on Washington's once oyster-rich coast into a death trap for juvenile oysters. "We're the tip of the spear for the worst of the worst because of the way the ocean circulates," said Bill Dewey, with Taylor Shellfish. Oysters now haven't reproduced on their own in Willapa Bay since 2005, so every grower now relies on hatchery produced larvae. Once the oysters make it to that stage they can survive acidic conditions just fine. But even producing larval oyster has become a complex game. Already, the Taylor Shellfish hatchery on Hood Canal and the owners of the Whiskey Creek Hatchery on Oregon's Netarts Bay have started tracking breezes because heavy north winds draw water	

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	from the deep that tends to be more damaging. Both now use expensive carbon-dioxide monitors to time the uptake of water into their growing tanks. Taylor has even begun a series of experiments to add sodium carbonate — similar to baking soda — to its hatchery waters to counteract Hood Canal's increasingly acidity. "We have a huge investment in that hatchery and we can't just turn off the lights and walk away," Dewey said. "We're investing instead in the science to try and find a way to make it work." But the Nisbets took another approach. "We're on an escalator" Goose Point Oysters employs 70 people and processes several million pounds of shellfish a year, which are sold all over the world. Since water quality is as important to an oyster grower as air to a human, the company had been following the changes closely. "We didn't know what was going on but we knew by 2009 that we could no longer depend on our current seed supply," said Kathleen Nisbet, Dave's daughter. When her father attended a meeting with NOAA oceanographers the depth of the problem became clear. "They said, 'We're on an escalator with this thing,' " she said. "The problem is going to get worse and we're going to have to adapt." Kathleen Nisbet had attended the University of Hawaii-Hilo and had contacts there, including Maria Haws, an associate professor of aquaculture. Hawaii also doesn't experience the same upwelling events and acidification doesn't appear to be a problem — at least not yet. "The Northwest is really the canary in the coal mine, though sooner or later we won't have any place to run if we don't somehow reverse the trend," Haws said. She and the Nisbet family spent several years working out kinks and started operating the hatchery earlier this year. "Luckily we've come out of this not too scarred," Kathleen Nisbet said. "We think we've come up with a way to work around things." But she said the experience has opened her eyes to how quickly acidification is taking hold. "What I think is scary is that not everybody knows this is real, that it's actually started to impact people," she said. "For now, here, it's oysters. But it's going to start affecting a lot of other fish and a lot of other food that we get from the sea." Craig Welch: 206-464-2093 or cwelch@seattletimes.com. On Twitter @craigawelch.	

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SA1	I strongly encourage NOAA/NMFS to not allow the Makah a waiver to hunt whales at all. There is NO way to determine which gray whales are from the main Eastern Pacific population, the residents or the highly endangered Western Pacific population. Killing a whale from the resident whale or Western Pacific population could prove catastrophic to those populations. They don't wear name tags. There is no way to tell them apart!!	Refer to the following Subsections: 3.4, Gray Whales; 4.4, Gray Whales.
SA2	Climate change is having a huge impact in the Arctic. Since the grays "summer" in the Bering Sea to feed, it would be short sighted to allow whaling when the effects of climate change on the grays hasn't been reviewed.	In response to this and related comments, we have updated relevant material in the new DEIS. Refer to the following Subsections: 3.4.3.6, Known and Potential Anthropogenic Impacts; 3.11, Noise; 5.1.3, Past, Present, and Reasonably Foreseeable Future Actions; 5.4, Gray Whales.
SA3	Whaling off the coast greatly impacts whale watching. I was on a trip in Puget Sound and I heard a woman ask the Captain to avoid Neah Bay because she didn't want to see a whale killed in front of her. Whale watching is a huge industry and allowing whaling off the coast of Washington destroys aesthetics visually and emotionally.	Refer to the following Subsections: 3.6.3.2.1, General Description of the Local Economy; 3.6.3.2.4, Contribution of Tourism to the Local Economy; 3.6.3.3.1, Summary of Economic Effects of the Makah Gray Whale Hunts; 3.6.3.3.2, Commercial Value of Whales; 3.8.3.3 Other Individuals and Organizations; 4.6.2.1, Tourism; 4.6.2.3, Whale-watching Industry; 4.6.3, Evaluation of Alternatives.
SA4	The Makah maintain this is about culture. NOAA knows as well as I do that this is a lie. We still have the documents that were sent to NOAA about the Makah's intent to open a whaling processing plant so they can sell whales to Japan. The EIS needs to address the global impact of the U.S. allowing aboriginal coastal whaling. We all know Japan wants this and by the Makah doing so with the U.S.'s blessing opens pandora's box. NO WHALING ANYWHERE! EVER! FOR ANY REASON!!	Refer to the following Subsections: 1.4.3, Other Environmental Assessments and Court Decisions Informing this Action; 3.17, National and International Regulatory Environment; 4.17, Regulatory Environment Governing Harvest of Marine Mammals; and 5.16, National and International Regulatory Environment.
SA5	The Makah have proven they can't be trusted! In 2007 the Makah killed a gray whale after their permit was revoked. Given the sensitive populations of grays involved, the Makah cannot be trusted to follow regulations.	The Makah have a whaling ordinance that, among other provisions, addresses enforcement, permits, violations, penalties, training/qualifications, monitoring and reporting, and whaling administration. Refer to Subsection 1.4.2, Summary of Recent Makah

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		Whaling ─ 1998 through 2014, and Appendix B of the new DEIS
SA6	The benefits of evolving beyond whaling and the positive impacts to the tribe for finally walking away from such a barbaric practice needs to be studied. NOAA has never demonstrated or evaluated the benefits to the tribe for not going forward.	The DEIS includes a No-action alternative. For other issues related to this comment refer to Subsection 2.4, Alternatives Considered but Eliminated from Detailed Analysis
SA7	NMFS needs to end their bias towards the Makah and deal with real science.	There is no information to support this comment.