Draft RIR/4(b)(2) Preparatory Assessment/IRFA of Critical Habitat Designation for the Arctic Ringed Seal

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Shaping the Future

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Acronyms

AAC	Alaska Administrative Code
APPS	Act to Prevent Pollution from Ships
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AGIA	Alaska Gasline Inducement Act
AIDEA	Alaska Industrial Development and Export Authority
ANILCA	Alaska National Interest Lands Conservation Act
ANCSA	Alaska Native Claims Settlement Act
AOGCA	Alaska Oil and Gas Conservation Act
AOGCC	Alaska Oil and Gas Conservation Commission

ANS	Alaska North Slope
AS	Alaska Statute
AIAN	American Indian or Alaskan Native
AMSA	Arctic Marine Shipping Assessment
ANWR	Arctic National Wildlife Refuge
ASRC	Arctic Slope Regional Corporation
A-Y-K	Arctic-Yukon-Kuskokwim
Boe	Barrels of oil equivalent
Bpd	Barrels per day
BCA	Benefit Cost Analysis
BSAI	Bering Sea and Aleutian Islands
BSNC	Bering Straits Native Corporation
Bcf	Billion cubic feet
BOF	Board of Fisheries
BLM	Bureau of Land Management
BOEM	Burea of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
CWA	Clean Water Act
CV	Contingent Valuation
CH	Critical Habitat
CHD	Critical Habitat Designation
ESA	Endangered Species Act
EPA	Environmental Protection Agency
EF	Essential Feature
EFH	Essential Fish Habitat
EEZ	Exclusive Economic Zone
EO	Executive Order
FMP	Fishery Management Plan
G&G	Geological and Geophysical
GHG	Greenhouse Gas
ISC	Ice Seal Committee
ITS	Incidental Take Statement
IFQ	Individual Fishing Quota
IHA	Incidental Harrassment Authorization
ITR	Incidental Take Regulation
ITQ	Individual Transferable Quota
IRFA	Initial Regulatory Flexibility Act Analysis

IPHC	International Pacific Halibut Commission
MSA	Magnuson-Stevens Act
MMPA	Marine Mammal Protection Act
MPPRCA	Marine Plastic Pollution Research and Control Act
MHW	Mean High Water
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPR-A	National Petroleum Reserve Alaska
NPDES	National Pollution Discharge Elimination System
NPFMC	North Pacific Fisheries Management Council
OPA	Oil Pollution Act
OMB	Office of Management and Budget
OCS	Outer Continental Shelf
PARS	Port Access Routing Study
RPA	Reasonable and Prudent Alternatives
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
RP	Revealed Preference
RHA	River and Harbors Act
SBA	Small Business Administration
SP	Stated Preference
SAFE	Stock Assessment and Fishery Evaluation
Tcf	Thousand cubic feet
TAC	Total Allowable Catch
TAPS	Trans-Alaska Pipeline System
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
WTP	Willingness to Pay

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1 Introduction

The proposed action being addressed in this Regulatory Impact Review (RIR)/Section 4(b)(2) Preparatory Assessment/Initial Regulatory Flexibility Act Analysis (IRFA) (hereinafter together, "RIR/4(b)(2) Preparatory Assessment/IRFA") is the designation of critical habitat (CH) for Arctic ringed seals in waters of the northern Bering Sea, Chukchi Sea, and Beaufort Sea, adjacent to the coast of Alaska, under the Endangered Species Act of 1973 (ESA). The purpose of this RIR/4(b)(2) Preparatory Assessment/IRFA is to evaluate the economic, socioeconomic, and other costs and benefits of designating CH for the Arctic ringed seal, and assist the Secretary of Commerce (Secretary) in determining whether the benefits of excluding any particular area from the CH designation (CHD) outweigh the benefits of including that particular area in the designation.[1] This information allows the National Marine Fisheries Service (NMFS) to address the requirements of Executive Orders (EOs) 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act.[2]

1.1 Listing and Critical Habitat Designation Background

Arctic ringed seals were listed as threatened under the ESA on December 28, 2012.[3] The final listing identifies the principal threat to Arctic ringed seals as the ongoing and anticipated loss of sea ice and snow cover stemming from climate change that is expected to materialize in the foreseeable future. Arctic ringed seals are found throughout the northern Bering Sea, and the Chukchi and Beaufort seas. They remain in contact with sea ice most of the year and use it as a platform for pupping, nursing, molting, and resting. The anticipated loss of ice, and in particular on-ice snow cover, is likely to result in population declines and is a significant threat to the persistence of Arctic ringed seals in the foreseeable future.

NMFS proposed to issue protective regulations for Arctic ringed seals under section 4(d) of the ESA to include all of the section 9(a)(1) protections automatically provided to species listed as endangered, including the prohibition on "take".[4] However, NMFS concluded in the final listing rule that the proposed 4(d) regulations are not necessary at this time because it is unlikely that they would provide appreciable conservation benefits.

The ESA requires designation of CH at the time of listing unless insufficient information exists to identify CH (i.e., it is not then determinable), in which case, the listing agency can extend the time for designation by one year. At the time of listing, NMFS found designation of CH for the Arctic ringed seal to be not determinable. Therefore, NMFS proposed CH in a separate rulemaking.

Section 3 of the ESA defines CH as:

> *(i) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found the physical and biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection: and (ii) specific areas*

1 16 U.S.C. §1533

2 Executive Order 12866, Regulatory Planning and Review , September 30, 1993; Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001; 5.U.S.C. §601 et seq; and Pub Law No. 104-121.

3 77 FR 76706.

4 75 FR 77476.

outside the geographical area occupied by the species at the time it is listed that are determined by the Secretary to be essential for the conservation of the species.[5]

Section 3 of the ESA defines the terms "conserve," "conserving," and "conservation" to mean "to use, and the use of, all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary."[6]

Based upon the best scientific data available, NMFS identified the following physical or biological features essential for conservation of Arctic ringed seals:

1. Sea ice habitat suitable for the formation and maintenance of subnivean birth lairs used for sheltering pups during whelping and nursing, which is defined as seasonal landfast (shorefast) ice, or dense, stable pack ice, that has undergone deformation and contains snowdrifts at least 54 cm deep.
2. Sea ice habitat suitable as a platform for basking and molting, which is defined as sea ice of 15 percent or more concentration.
3. Primary prey resources to support Arctic ringed seals, which are defined to be Arctic cod, saffron cod, shrimps, and amphipods.

A single "specific area" was identified within the geographical area occupied by Arctic ringed seals at the time of listing that contains one or more of these essential features (EFs). This area includes waters in the northern Bering, Chukchi and Beaufort seas from the "coast line" of Alaska as that term has been defined in the Submerged Lands Act ("the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters"), 43 U.S.C. 1301(c), to an offshore limit within the United States (U.S.) Exclusive Economic Zone (EEZ) (**Figure 2-1**). As discussed in detail in the proposed rule to designate CH for the Arctic ringed seal, NMFS determined that the EFs within this area may require special management considerations or protection. NMFS has not identified any areas outside the geographical area occupied by Arctic ringed seal that are essential for their conservation. The proposed Arctic ringed seal CHD is described in further detail in the proposed rule to designate CH, which is incorporated here by reference. A map of proposed Arctic ringed seal CH is provided in **Section 1.5** below.

1.2 Purpose and Need

Before designating CH, Section 4 of the ESA requires that NMFS consider the economic impacts, impacts on national security, and other relevant impacts of designating any particular area as CH. Section 4 of the ESA also provides that the Secretary may exclude any particular area from CH if the benefits of exclusion outweigh the benefits of inclusion, unless excluding an area from CH will result in the extinction of the species concerned [Section 4(b)(2)]. NMFS must also address the requirements of EOs 12866 and 13211, and the RFA, as amended by the Small Business Regulatory Enforcement Fairness Act.[7]

[5] Endangered Species Act of 1973, Section 3(5)(A) (as amended by P.L. 94–325, June 30, 1976; P.L. 94–359, July 12, 1976; P.L. 95–212, December 19, 1977; P.L. 95–632, November 10, 1978; P.L. 96–159, December 28, 1979; 97–304, October 13, 1982; P.L. 98–327, June 25, 1984; and P.L. 100–478, October 7, 1988; P.L. 100–653, November 14, 1988; and P.L. 100–707, November 23, 1988).

[6] Endangered Species Act of 1973, Section 3(3) (as amended by P.L. 94–325, June 30, 1976; P.L. 94–359, July 12, 1976; P.L. 95–212, December 19, 1977; P.L. 95–632, November 10, 1978; P.L. 96–159, December 28, 1979; 97–304, October 13, 1982; P.L. 98–327, June 25, 1984; and P.L. 100–478, October 7, 1988; P.L. 100–653, November 14, 1988; and P.L. 100–707, November 23, 1988).

[7] Executive Order 12866, Regulatory Planning and Review , September 30, 1993; Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001; 5.U.S.C. §601 et seq; and Pub Law No. 104-121.

EO 12866 requires that the Office of Management and Budget (OMB) review proposed regulatory programs that are considered to be "significant". OMB makes this determination based primarily upon the analysis contained in the RIR that accompanies the proposed action. A significant regulatory action is one that is likely to:

1. Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities.
2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency.
3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof.
4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in EO 12866.

RFA requirements serve to inform the agency, as well as the public, of the expected and potential economic impacts of a proposed action, to ensure that the agency considers alternatives that minimize significant adverse economic impacts of the rule on a substantial number of small entities, while meeting the goals and objectives of the final action, consistent with applicable law.

This document contains the RIR analysis, required under EO 12866; Section 4(b)(2) Preparatory Assessment, required under ESA; and the IRFA, required by the RFA.

1.3 Objectives

To consider the potential economic, national security, and other impacts associated with the designation of CH for the Arctic ringed seal, NMFS has identified the following primary objectives for this report:

1. Describe existing regulations and policies that provide baseline protection to the Arctic ringed seal and its habitat (i.e., baseline conditions without CHD);
2. Identify, compile, characterize, and synthesize economic, capital investment, and associated information for activities in and around the Bering Sea, Chukchi Sea, and Beaufort Sea, and adjacent coastal areas of Alaska, that may be affected by the proposed CHD;
3. Determine the incremental economic and other relevant impacts of the proposed CHD relative to the baseline without CHD; and
4. Apply the information compiled through the first three objectives to prepare an RIR/4(b)(2) Preparatory Assessment/IRFA of the proposed Arctic ringed seal CHD and any alternative CHD proposals.

1.4 Regulatory Impact Requirements

Below we summarize the requirements of each of the three components of this document: RIR, 4(b)(2) Preparatory Assessment, and the IRFA.

1.4.1 Requirements of Regulatory Impact Review

The following statement from EO12866 summarizes the requirements of an RIR:

> *In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environment, public health and*

> *safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.*[8]

The following are the *minimum* requirements for an RIR document:

1. A complete *quantitative* description (to the extent practicable) of the problem being addressed;
2. A clear description of the management objectives;
3. A comprehensive description of each alternative (including the No Action alternative);
4. A thorough description of the expected effects (both positive and negative) of each alternative, on *each* potentially impacted group; and
5. A *qualitative* analysis of the benefits and costs of each alternative, with a summary of the net National benefit (possibly negative). When adequate data are available, expected benefits and costs should be *quantified* to the fullest extent that these can be usefully estimated.

1.4.2 Requirements of Section 4(b)(2) of the ESA

Section 4(b)(2)[9] of the ESA requires NMFS to consider the economic impact, impact on national security, and any other relevant impact, of specifying any particular area as CH. Section 4(b)(2) also provides NMFS, on behalf of the Secretary, with discretion to exclude any particular area from a designation if she determines that the benefits of excluding that area outweigh the benefits of including it in the designation, unless exclusion will result in extinction of the species.

A Section 4(b)(2) analysis consists of two components:

1. An initial mandatory requirement that the agency consider certain impacts of CHD; and
2. A discretionary component, wherein the agency, informed by those considerations, may propose excluding particular areas from the designation.

The ESA's legislative history explains the broad latitude afforded NMFS in its consideration of impacts:

> *Economics and any other relevant impact shall be considered by the Secretary in setting the limits of critical habitat for such a species. The Secretary is not required to give economics or any other "relevant impact" predominant consideration in his specification of critical habitat…..The consideration and weight given to any particular impact is completely within the Secretary's discretion.*[10, 11]

In exercising its discretion under Section 4(b)(2), NMFS may:

1. Identify particular areas for possible exclusion from CHD;
2. Determine the benefit of designation (e.g., biological, economic, or other benefits) of each particular area;
3. Determine the benefit of exclusion of each particular area;
4. Determine whether the benefits of exclusion outweigh the benefits of designation; and
5. Determine whether the exclusions (if any) will result in extinction of the species.

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8 Executive Order 12866, Regulatory Planning and Review, Section 1(a), September 30, 1993.

9 16 U.S.C. 1533(b)(1)(A)

10 H.R. Rep. No. 95-1625, at 16-17 (1978), 1978 U.S.C.A.N. 9453, 9466-67.

11 The provisions requiring consideration of impacts were originally discussed as applicable only to critical habitat designations for invertebrate species. However, section 4(b)(2) as enacted is not limited to invertebrates, and NMFS and FWS have applied the provision to designations for vertebrate and invertebrate species.

1.4.3 Requirements of Regulatory Flexibility Act

Major goals of the RFA are as follows:

1. To increase agency awareness and understanding of the impact of their regulations on small entities[12];
2. To require that agencies communicate and explain their findings to the public; and
3. To encourage agencies to use flexibility and to provide regulatory relief to small entities.

The RFA emphasizes predicting impacts on small entities as a group, distinct from other entities, and on the consideration of alternatives that may minimize adverse economic impacts, consistent with all applicable law, while still achieving the stated objective of the action. Under 5 U.S.C., Section 603(b) and (c) of the RFA, each IRFA is required to contain the following elements:

1. A description of the reasons why action by the agency is being considered;
2. A succinct statement of the objectives of, and legal basis for, the proposed rule;
3. A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;
4. A description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;
5. An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap, or conflict with the proposed rule;
6. A description of any significant alternatives to the proposed rule that accomplish the stated objectives (of the proposed action), consistent with applicable statutes, and that would minimize any significant adverse economic impact of the proposed rule on directly regulated small entities.

1.5 Description of Critical Habitat Designation Alternatives

The analysis of economic impacts of the proposed Arctic ringed seal CHD considers two alternatives:

> **Alternative 1. No Action (status quo) "Without CH":** This alternative represents the baseline for the analysis, considering the protections already afforded to Arctic ringed seals. The baseline for this analysis is the state of regulation, absent CHD, that provides protection to the Arctic ringed seal under the ESA, as well as under other Federal, State, and local regulations. Conservation and recovery under the ESA of the listed species would depend exclusively upon the protections provided under the "jeopardy" provisions of Section 7 of the ESA. This analysis describes how baseline conservation for the Arctic ringed seal is currently implemented to provide the context for the incremental analysis under Alternative 2.

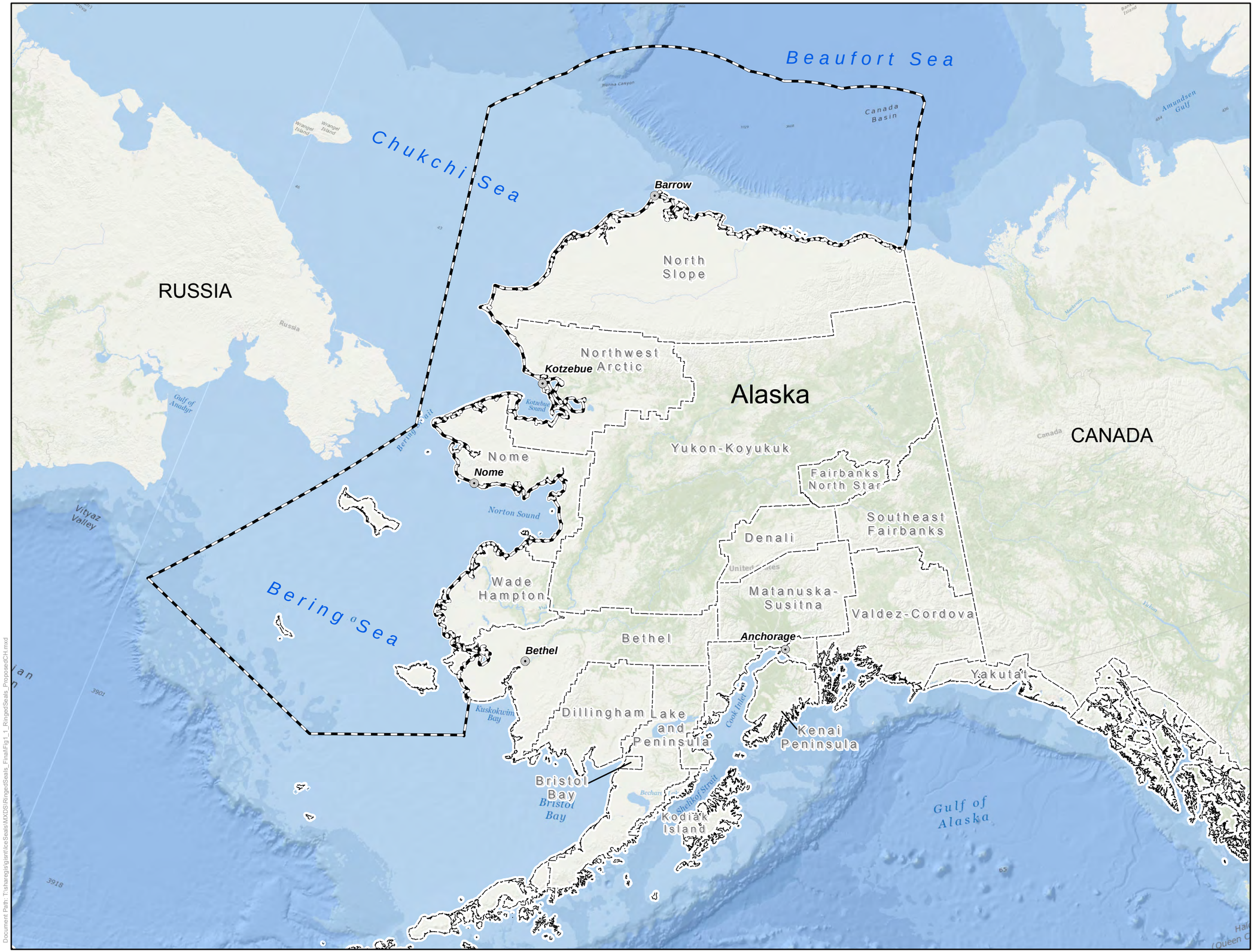
> **Alternative 2. Proposed CHD:** This alternative analyzes the incremental impacts due specifically to the designation of CH for the Arctic ringed seal. This area proposed for CHD under this alternative includes waters in the northern Bering, Chukchi and Beaufort seas from the "coast line" of Alaska as that term has been defined in the Submerged Lands Act ("the line of ordinary low water along that

[12] The RFA recognizes and defines three kinds of small entities: (1) small businesses, (2) small non-profit organizations, and (3) small government jurisdictions. Section 601(3) of the RFA defines a "small business" as having the same meaning as "small business concern" which is defined under Section 3 of the Small Business Act (SBA). The SBA has established size criteria for all major industry sectors in the U.S., based on such factors as annual gross receipts and number of employees. The RFA defines "small organizations" as any not-for-profit enterprise that is independently owned and operated and is not dominant in its field. The RFA defines "small governmental jurisdictions" as governments of cities, counties, towns, townships, villages, school districts, or special districts with populations of fewer than 50,000.

portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters"), 43 U.S.C. 1301(c), to an offshore limit within the U.S. EEZ. The impacts associated with this proposed CHD are those not expected to occur absent this CHD.

Figure 1-1

Proposed Arctic Ringed Seal Critical Habitat: Waters of the Bering Sea, Chukchi Sea, and Beaufort Sea, Alaska



Legend

- Major City
- Proposed Ringed Seal Critical Habitat
- Borough/Census Area

0 50 100 200
Miles

N

Data Source: National Marine Fisheries Service

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1.6 Structure of the Report

The remainder of this report is organized as follows:

> Section 2: Methodology and Framework for Analysis

> Section 3: Types of Economic Costs of Critical Habitat Designation

> Section 4: Types of Economic Benefits of Critical Habitat Designation

> Section 5: Contextual Information

> Section 6: Costs and Benefits of Arctic Ringed Seal Critical Habitat Designation

> Section 7: Expected Net Benefit to the Nation of Arctic Ringed Seal Critical Habitat Designation

> Section 8: Distributional Impacts of Arctic Ringed Seal Critical Habitat Designation

> Section 9: Area Exclusions– A Section 4(b)(2) Preparatory Assessment of Arctic ringed seal Critical Habitat Designation

> Section 10: Potential Impacts on Small Entities (Regulatory Flexibility Act Analysis) and Energy Impact Assessment of Arctic Ringed Seal Critical Habitat Designation

> Section 11: List of Preparers

> Section 12: References

2 Methodology and Framework for Analysis

This section describes the general framework for the analysis. It then describes, in economic terms, the general categories of economic effects that are the focus of regulatory impact analysis, including a discussion of both net benefit and distributional effects. Next, it describes the specific framework and methods to evaluate benefits of CHD. This is followed by sections that define the baseline and incremental effects of the proposed Arctic ringed seal CHD, and the potentially affected economic groups, entities, and sectors associated with the proposed CHD. It concludes with a presentation of the time-frame for the analysis and information sources relied upon in the analysis.

2.1 General Framework for the Analysis

A benefit-cost analysis (BCA) has been prepared to evaluate the alternatives under consideration in the designation of CH for the Arctic ringed seal. This framework is preparatory to and supports the ESA's Section 4(b)(2) decision-making process, by allowing NMFS, on behalf of the Secretary, to compare an estimate of the "benefits of exclusion" of any particular area from the designation, against an estimate of the "benefits of inclusion" of that area.[13] In addition to having strong scientific support, this approach has support from OMB, through its guidelines on regulatory analysis.[14] A BCA is a well-established procedure for assessing the "best" course or scale of action, where "best" is that course which maximizes net benefits. Because an analysis of benefits and costs seeks to empirically measure the value of an activity in net benefit terms, it typically requires that a single metric, most commonly U.S. dollars, be used to gauge both benefits and costs. While all efforts are made to monetize the net benefits associated with the Arctic ringed seal CHD, these benefits and costs are quantified and/or discussed qualitatively where sufficient data with which to monetize are not available. EO 12866 explicitly provides for, and OMB guidance concurs in, use of a non-quantitative BCA that is consistent with economic theory and with the best available information, when meaningful quantification is not possible.

2.2 Categories of Potential Economic Effects of Critical Habitat Designation

This economic analysis considers the net benefit to the Nation, economic efficiency, and distributional effects that may result from designation of habitat determined to be "critical" to the conservation and recovery of the Arctic ringed seal. Economic efficiency effects generally reflect "opportunity costs" associated with the commitment of resources required to accomplish, in this context, habitat conservation. For example, if the set of activities that may take place on a parcel of land in the vicinity of Arctic ringed seal CH is limited as a result of the CHD (because that set of activities would be expected to destroy or adversely modify CH), the market value of the land may be reduced. This reduction in value represents one potential measure of opportunity cost or change in economic efficiency attributable to the CHD. The opportunity costs, attributable to the aforementioned limits, are in contrast to the welfare gains that accrue from not allowing unconstrained actions to destroy or adversely modify CH without considering alternatives and trade-offs. (It is also possible that the market value of adjacent parcels could rise as a result of the protections afforded by CHD.) Economic efficiency effects may also include indirect costs associated with changes in economic activities due to regulatory uncertainty, time delays, and additional state and local legislation or regulation triggered by CHD.

Similarly, the costs of a Federal action agency's consultation with NMFS on actions that may affect CH, under Section 7, represent opportunity costs of the designation. These consultation provisions were

[13] National Marine Fisheries Service, Northwest Fisheries Science Center, August 2005, "Final Economic Analysis of Critical Habitat Designation for 12 West Coast Salmon and Steelhead ESUs."

[14] Office of Management and Budget. September 17, 2003. Circular A-4. Website: http://www.whitehouse.gov/omb/circulars_a004_a-4.

expressly established in law, recognizing their inherent costs, but were deemed of sufficient benefit to society's interests (under ESA) to justify incurring this administrative commitment of resources (i.e., the benefits exceed the costs). The BCA framework is intended to comprehensively identify and assess all such trade-offs.

This analysis also addresses the distribution of costs and benefits associated with the designation, to the extent a Federal nexus exists, including an assessment of any local or regional economic effects of habitat conservation, and the potential effects of conservation efforts on small entities and the energy industry. This information may be used by decision-makers to assess whether the costs and benefits of designation of CH for the Arctic ringed seal inequitably burden or benefit a particular group or economic sector. For example, while conservation efforts may have a relatively small effect on the national economy as a whole, individuals employed in a particular sector of the regional or local economy may experience substantially greater economic effects. The differences between economic efficiency effects (i.e., consumers' and producers' surpluses), net benefits (i.e., net social welfare), and distributional effects (i.e., measures of change in economic activity), as well as their application in this analysis, are discussed in greater detail below.

2.2.1 Efficiency Effects

At the guidance of the OMB and in compliance with EO12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. Economic efficiency is typically measured against a "baseline" or *status quo* condition (e.g., the No Action alternative), with all attributable gains and losses compared for each alternative regulatory path. In the context of regulations that would designate CH for the Arctic ringed seal, society seeks to accrue benefits from the conservation, recovery, and stewardship of this threatened species (reflected in the provisions of the ESA). At the same time, these welfare gains come at a cost to society. These costs reflect the opportunity cost of resources used or benefits foregone by society, as a result of the specific regulatory alternative considered. Economists generally characterize opportunity costs in terms of changes in producer and/or consumer surpluses in affected markets.[15] Economic efficiency analyses seeks to measure, to the extent practicable, the relative trade-offs of each competing regulatory alternative (including the No Action alternative) to assure: 1) that a full accounting of all relevant costs and benefits is made; and 2) that the most economically efficient *available*[16] alternative is identified.

It is, however, not always possible to measure each cost and each benefit in a common metric (e.g., U.S. dollars). When the regulatory action results in welfare changes with both market and non-market characteristics, as is the case for threatened and endangered species management, conservation, and recovery efforts, markets (and, therefore, prices) do not exist for many important components of resource management. The results of such an analysis can be severely biased by excessive reliance on price signals from traditional markets and their interpretation in a BCA, especially within the context of environmental assets with complex and significant attributes not reflected in traditional market structures.

In some instances, compliance costs may provide a reasonable approximation of the economic burden associated with a regulatory action. For example, a Federal agency, such as the U.S. Army Corps of Engineers (USACE), may enter into a consultation with NMFS to ensure that a particular activity it plans to undertake, fund, or permit will not adversely modify CH. The effort required for the consultation (which, in practice, may be quite small), is an economic opportunity cost; because the manager's time and effort

[15] For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see: Gramlich, Edward M. 1990. *A Guide to Benefit-Cost Analysis* (2nd Ed.). Waveland Press, Inc.; and Environmental Protection Agency, 2000, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003. September. Website: http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html.

[16] It is occasionally the case that a specific alternative is mandated by law, even though it may not be the most economically efficient solution.

could have been spent on an alternative activity, had the area not been regulated as part of the CHD. However, this "burden" captures only one side of the equation. The investment of time and resources spent on consultation also "yields" social benefits, by assuring that inadvertent, unintentional, or inappropriate actions that could destroy or adversely modify CH are not permitted, sanctioned, or undertaken by a Federal agency, without objective public scrutiny, as required under ESA and other relevant law.

This analysis begins by measuring the costs and benefits associated with designation of CH for the Arctic ringed seal. Compliance costs may, under certain limiting assumptions, provide a first approximation of the direct "cost" side of the change in economic efficiency. However, if the cost of conservation efforts is expected to significantly affect markets, the analysis will be expanded to consider potential changes in consumers' and/or producers' surpluses in such affected markets.

2.2.2 Net Benefits

Having examined and assessed the size and scope of market-based effects of the CHD on economic efficiency, the analysis moves beyond this narrow characterization of "value," to evaluate the comprehensive net benefits attributable to CHD. Net benefits are the benefits that remain after adjusting for the costs associated with CHD. As will become apparent, ESA CHD affects a complex suite of market and non-market, consumptive and non-consumptive, direct, indirect, and passive use values, inherent in conservation and recovery of threatened and endangered species and protection of associated CHs.

2.2.3 Distributional and Regional Economic Effects

Measurements of change in economic benefits and costs focus on the net welfare outcome attributable to a specific regulatory action, without consideration of how certain users, sectors, or other groups of people are affected. Thus, an analysis of net benefit effects, alone, may miss important distributional considerations. The OMB encourages Federal agencies to consider distributional effects, separately from benefits and costs.[17] This analysis considers several types of distributional effects, including effects on small entities; effects on energy supply, distribution, and use; regional economic effects; and environmental justice effects. It is important to note that these measures are fundamentally different economic attributes from benefits and/or costs and, thus, cannot be added to or compared with estimates of net economic changes. Distributional effect estimators describe changes in "economic activity," not economic benefits and costs.

2.2.3.1 Effects on Small Entities and Energy Supply, Distribution, and Use

This analysis also considers how small entities, including small businesses, not-for-profit organizations, and governments, as defined by the RFA, might be affected by incremental conservation efforts attributable to CHD.[18] In addition, in response to EO13211 "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future effects of CHD for the Arctic ringed seal on the energy industry and its customers.[19]

2.2.3.2 Regional Economic Effects

Regional economic impact analysis can provide an assessment of the potential localized effects of CHD. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in regional economic "activity", resulting from a regulatory action.

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17 Office of Management and Budget. September 17, 2003. Circular A-4. Website: http://www.whitehouse.gov/omb/circulars_a004_a-4.

18 5 U.S.C. §§601 et seq.

19 Executive Order 13211. May 18, 2001. *Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use*.

Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that represent the relationship between a change in one sector of the economy (e.g., expenditures by fishermen) and the effect of that change on economic output, income, or employment in other local sectors (e.g., suppliers of goods and services to those fishermen). These economic data provide a numerical estimate of the magnitude of growth or contraction of jobs, income, and transactions *in a specific local economy*. These economic impacts reflect "activity" (i.e., they characterize "transfers" among local or regional components of the broader economy), not "net" changes in the economy, as a whole.

The use of regional input/output models in an analysis of the economic impacts of CHD can overstate the long-term effects of a regulatory change. Most importantly, these models provide a static view of the economy of a region or locality. That is, they attempt to measure the initial impact of a regulatory change on aspects of a specific local economy, but do not consider long-term adjustments that the economy will make in response to this change. For example, these models often provide estimates of the number of jobs lost in a given local or regional market, as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.

Despite these and other limitations, in certain circumstances, the regional economic impact analysis may provide useful information about the scale, scope, and distribution of *localized* changes in economic activity. It is important to remember that measures of regional economic activity generally reflect shifts in resource use and transfers of economic activity, rather than net welfare losses or gains. Thus, these types of distributional impacts are reported separately from net benefit effects (i.e., not summed), and cannot be compared with estimates of net benefits.

2.2.3.3 Environmental Justice Effects

The analysis considers whether CHD will result in disproportionately high adverse effects on minority or low income populations. The concept of environmental justice is rooted in the Civil Rights Act of 1964, which prohibited discrimination in Federally-assisted programs, and in EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations," issued February 11, 1994. EO 12898 was intended to ensure that Federal actions and policies do not result in disproportionately high adverse effects on minority or low-income populations. Environmental justice concerns may arise from effects on the natural and physical environment that produce human health or ecological outcomes, or from adverse social or economic changes.

To conduct the environmental justice analysis, it is necessary to determine whether there are adverse human health, environmental, social, or economic effects anticipated as a result of CHD, and then it is necessary to determine if low-income or minority groups would be disproportionately impacted by such adverse effects.

2.3 Framework for Estimating Benefits

The CHD will generate economic benefits if it increases individual well-being, or "utility," aggregated across all individuals in the nation as compared with what would otherwise occur absent CHD. In the following discussion, a brief conceptual overview is provided of how economists measure an increase in well-being from consumption of a good or service. This understanding is useful in that it explains: 1) how the CHD might translate into a source of economic benefit or increased individual well-being; and 2) how this benefit could be empirically measured (i.e., quantified).

Economists measure the increase in well-being to consumers of a good or service as the difference between the price consumers pay for the good or service, and the benefit they derive from it (which is measured as the maximum price they would be willing to pay, and commonly referred to as willingness-

to-pay or WTP). For example, if a tourist would be willing to pay $100 for, say, a guided fishing trip, but only has to pay $75, then the tourist has a net benefit, or increase in well-being, from the trip equal to $25. Assuming all other things equal, a change, or increase, in this well-being from the consumption of goods and services can thus occur either because the price falls, or because the quality of the good or service rises and results in increased value to (or WTP by) the consumer. In the case of the CHD, this may result in increased well-being (and WTP) if CHD results in habitat enhancements that increase the quality of goods and services related to or deriving from Arctic ringed seal habitat.

If increased public awareness and scientific knowledge increase due to the proposed CHD, this too may cause increased well-being by causing personal preferences to change. If personal preferences change, such that public perception and enjoyment of Arctic ringed seals and their habitat increases for a given habitat quality level or population of Arctic ringed seals, the proposed CHD will also increase well-being and WTP even without changes in the quality of Arctic ringed seal habitat.

2.3.1 Benefit Valuation Methods

Economists typically rely on observed trades between willing buyers and willing sellers to identify the market-clearing price of a good or service. As described in the introduction to this section, environmental goods for which no market exists (non-market goods) are particularly challenging to value, because absent an observable market, no such "price" is revealed.

The value of non-market goods may be estimated using either revealed preference (RP) or stated preference (SP) valuation approaches. RP valuation methods use information on observed behavior to infer the value of the non-market good or service.[20] As such, these methods require data on observable behavior to be linked to the non-market good in question.[21] SP methods, on the other hand, involve asking individuals carefully worded hypothetical market questions to either directly or indirectly infer the value they place on a non-market good or service.[22] Thus, the principal difference between RP and SP methods is the type of data used. RP methods use data on observed behavior to infer economic values, while SP methods use data on stated or intended behavior to infer economic values. Due to its reliance on observable behavior, RP methods are generally not able to estimate nonuse values, which, by definition, are not tied directly to observable behavior.[23] Thus, researchers generally utilize SP methods to estimate nonuse values.

The most commonly used and best known stated preference method is the contingent valuation method (CV), which in actuality is a class of methods. In CV, economic values for a non-market good or service are revealed through survey questions that set up hypothetical markets for a non-market good or service, and involve asking the respondent to indicate their WTP (or willingness-to-accept compensation) for (or to

[20] Bockstael, Nancy E., and Kenneth E. McConnell. 1983. Welfare Measurement in the Household Production Function Framework. *American Economic Review.* 73(4); and Boyle, Kevin J. 2003. Introduction to Revealed Preference Methods. Patricia A. Champ, Kevin J. Boyle, and Thomas C. Brown editions. *A Primer on Nonmarket Valuation*. Kluwer Academic Publishers.

[21] Included in the category of RP methods are travel cost methods (Parsons, 2003), hedonic methods (Taylor, 2003), and the avoidance expenditure approach (Dickie, 2003). The appropriateness of each method depends upon how the non-market good enters individuals' preferences, as discussed above and in Freeman (2003). In many of these methods, the economic value of the non-market good is measured through changes in the observable demand for a related good, such as a good that is consumed in conjunction with the non-market good (complement) or instead of the non-market good (substitute).

[22] Mitchell, Robert C., and Richard T. Carson. 1989. Using Surveys to Value Public Goods: The Contingent Valuation Method. *Resources for the Future*; and Carson, Richard T., Nicholas E. Flores, and Norman F. Meade. 2001. Contingent Valuation: Controversies and Evidence. *Environmental and Resource Economics*-19.

[23] However, Larson (1992) has shown that under the assumption of what is termed Hicks-neutrality, the nonuse value is measurable from an analysis of market demand, though Flores (1996) has shown that the conditions for Hicks-neutrality to occur are unlikely to be met in practice. In addition, Carson, Flores, and Mitchell (1999) point out that any "technique capable of constructing the missing market for these types of goods is potentially capable of obtaining total-value estimates," (page 109) and since total value is the sum of use and nonuse values, the total economic value estimate would include nonuse value. Simulated markets where actual transactions occur (generally in experimental conditions) for the non-market good and actual referenda involving the non-market good are the other methods for estimating these values.

forgo) the good or service. In a typical CV survey, a public good is described, such as a program to protect one or more "Threatened or Endangered" species, or their CH, and respondents are asked questions to elicit their WTP for the public good through a payment vehicle, like taxes or contributions to a trust fund.[24, 25] In practice, SP techniques are technically demanding to implement, and results are often challenging to interpret. However, their use has been affirmed by Federal Courts, employed by numerous Federal and state agencies, and refined through over more than 25 years of research, leading to a rich body of peer-reviewed literature.

2.4 Baseline and Incremental Effects

This analysis examines the state of the world with and without the designation of CH for the Arctic ringed seal. The "without CHD" scenario represents the baseline (i.e., the No Action alternative) for the analysis, considering habitat protections already extended to Arctic ringed seal under its ESA Federal listing or under other Federal, State, and local regulations, including collateral protections resulting from protection afforded other listed species, such as the polar bear. The "with CHD" scenario attempts to describe the incremental effects associated specifically with, and unique to, the proposed CHD for the Arctic ringed seal. This aspect of the analysis also provides an overview of costs and benefits that may be considered co-extensive with the listing of Arctic ringed seals and other baseline protections. The focus of the analysis, however, is determining the increment of effects that can be uniquely attributed to CH, to the fullest extent practicable.[26]

The first step in the economic analysis is to identify the baseline level of protection currently afforded the Arctic ringed seal and its habitat by existing regulations, absent the proposed CHD. This section provides a description of the methodology used to identify baseline conditions, against which incremental effects stemming from the proposed CHD for the Arctic ringed seal (i.e., with the proposed CHD) will be contrasted. It also describes the incremental effects in more detail.

2.4.1 Baseline for the Analysis

The baseline for this analysis is the existing state of regulation that provides protection to the Arctic ringed seal under the ESA, as well as under other Federal, State, and local laws, regulations, and guidelines, absent the CHD. The baseline includes the protections of Sections 7, 9, and 10 of the ESA, and economic effects resulting from these protections in the absence of CHD for the Arctic ringed seal.

Section 7 of the ESA requires Federal agencies to consult with NMFS to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species (i.e., the "jeopardy standard"). The portion of the administrative costs of consultations under the jeopardy standard and the effects of any project modifications resulting from consideration of this standard are considered baseline effects.

The protection of listed species and habitat is not limited to the ESA. Other Federal statues, as well as state and local laws, may also seek to protect the natural resources under their jurisdiction. If compliance

[24] Cummings, R.G., D.S. Brookshire, and W.D. Schultz. 1986. Valuing Environmental Goods: An Assessment of the Contingent Valuation Method. Rowman & Allanheld Publishers. Mitchell, Robert C., and Richard T. Carson. 1989. Using Surveys to Value Public Goods: The Contingent Valuation Method. *Resources for the Future*. Arrow, Kenneth, Robert Solow, Paul R. Portney, Edward E. Leamer, Roy Radner, and Howard Schuman. 1993. Report of the NOAA Panel on Contingent Valuation. *Federal Register*-58.

[25] While willingness-to-accept is sometimes the more relevant welfare measure, empirical and experimental evidence has pointed to the use of WTP welfare measures in stated preference surveys (e.g., Arrow, et al. 1993. Adamowicz, Bhardwaj, and McNab. 1993. Mansfield. 1999.).

[26] We note that although the focus of this analysis is on the incremental effects of the rule, due to uncertainties with regard to future management actions associated with Arctic ringed seal critical habitat, it was difficult in some cases to exclude potential impacts that may already occur under the baseline. Thus, the analysis may include some costs which would have occurred under the baseline, regardless of this rule (i.e., co-extensive costs). An effort to explicitly identify the presence of co-extensive cost estimates and distinguish them from uniquely incremental CH costs, whenever possible, has been made herein.

with the Clean Water Act (CWA) or state environmental quality laws, for example, protects habitat for the species, such protective efforts are considered to be baseline protections and costs associated with these efforts are categorized accordingly. Of particular relevance to this report, the Marine Mammal Protection Act (MMPA) provides strong baseline protection for Arctic ringed seals. Many of the relevant existing regulations are discussed in **Section 5.3**.

2.4.2 Types of Economic Costs and Benefits of Critical Habitat Designation

This analysis separately monetizes, quantifies, or qualitatively assesses the "incremental" costs and benefits identified as deriving from this proposed CHD action, to the fullest extent practicable (a description of the types of costs is provided in **Section 3,** while descriptions of types of benefits are provided in **Section 4**). This incremental analysis is to determine the effects on human uses and activities uniquely attributable to the CHD that are above and beyond those effects due to existing or planned (required or voluntary) conservation efforts being conducted under other Federal, State, and local regulations or guidelines, including the ESA listing.

When CH is designated, Section 7 requires Federal agencies to ensure that their actions will not result in its destruction or adverse modification (in addition to, and separate from, considering whether the actions are likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of CH in Section 7 consultations, and the additional costs of implementing project modifications, uniquely resulting from the protection of CH, are the direct compliance costs of CHD. These costs are not in the baseline and are appropriately considered incremental costs of the proposed CHD.

Figure 2-1 depicts the decision analysis regarding whether an effect should be considered incremental. The following sections describe this decision tree in detail.

Incremental costs may be the direct compliance costs associated with additional effort for forecasted consultations, reinitiated consultations, new consultations occurring specifically because of the CHD, and additional project modifications that would not otherwise have been required under the jeopardy standard. Additionally, indirect incremental costs of CHD to activities that do not have a Federal nexus may accrue as a result of: 1) changes in activities that do have a Federal nexus (e.g., reduced expansion at a Federally permitted port facility affecting growth of businesses associated with the Port or using Port facilities); 2) triggering of additional requirements under state or local laws intended to protect sensitive habitat; and 3) uncertainty and perceptional[27] effects on markets. The nature of these costs is described in greater detail below.

[27] While listed here under incremental costs, perceptional effects on the market need not be limited to adverse impacts. Generally, it is assumed that property values for parcels adjacent to CH will fall upon designation, owing to perceived limits on use. However, it may be equally possible that proximity to designated CH may enhance the market value of a parcel (e.g., a home site abutting an area designated as CH may command a premium price, because CHD assures that no action with a Federal nexus will be allowed to destroy or adversely modify the essential features of the CH).

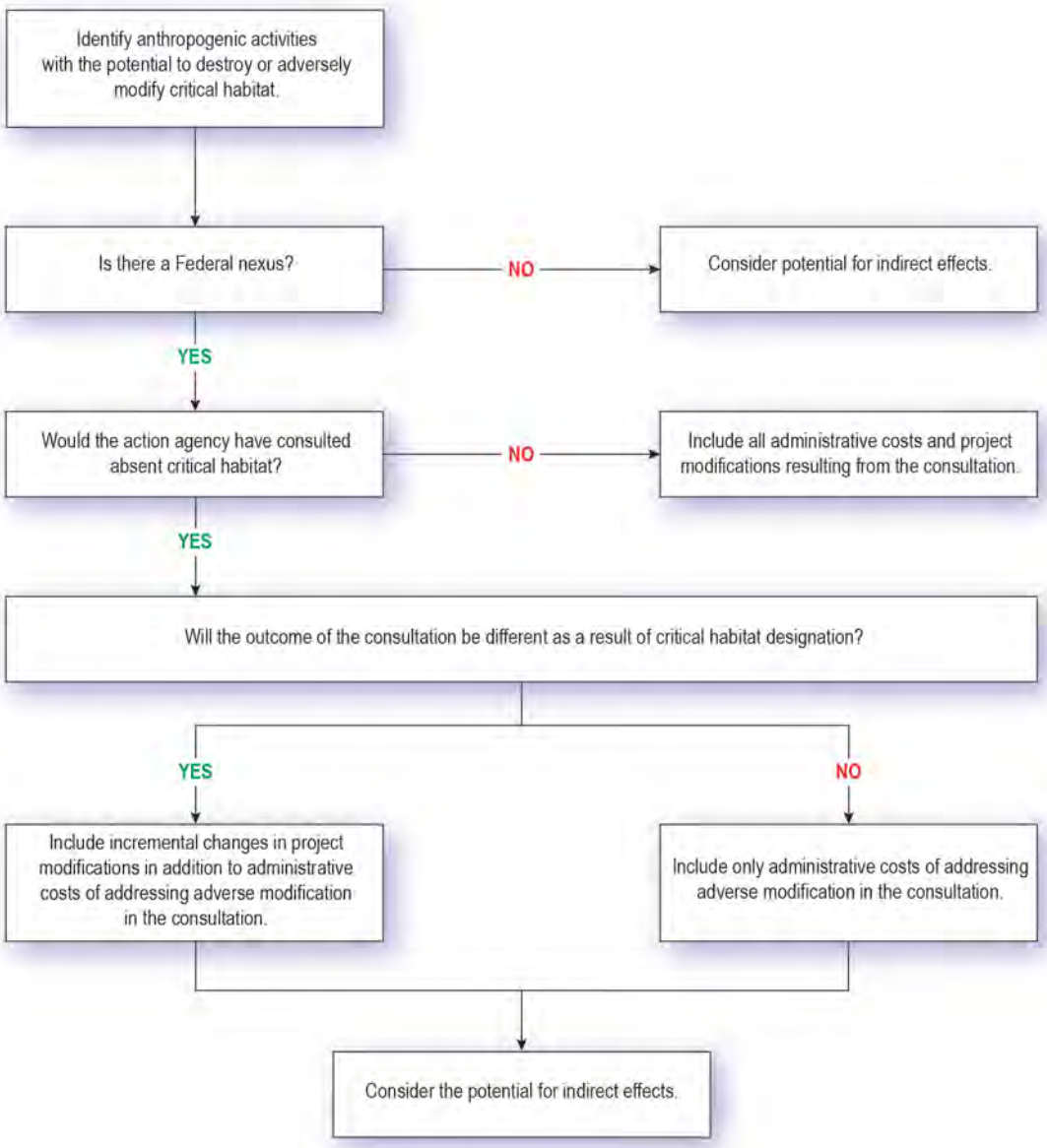

Figure 2-1 Identifying Incremental Effects of Critical Habitat Designation

This report considers activities that may be affected by proposed Arctic ringed seal CH. The final listing identified the principal threat to Arctic ringed seals as the ongoing and anticipated loss of sea ice and snow cover stemming from climate change. Activities that release carbon dioxide and other GHGs into the atmosphere are a major contributing factor to climate change and loss of sea ice. However, the best scientific data currently available do not allow a clear causal connection to be made between any particular single source of greenhouse gas (GHG) emissions and identifiable effects on members of a listed species or the physical or biological features of its designated CH. This analysis addresses only those costs and benefits that are reasonably predictable and attributable to the proposed CHD. Accordingly, in analyzing the costs and benefits of the proposed CHD, this report does not include consultations on any potential project simply because it may involve GHG emissions.

2.5 Analytic Time-Frame

The analysis estimates costs and benefits based on activities that are reasonably predictable, including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. This analysis considers economic effects of activities from 2014 (anticipated year the species' final CHD becomes effective) through 2023 (10 years from the expected year of final CHD) and estimates economic costs within this 10-year period. This interval of ten years, widely employed in the policy analysis arena, allows sufficient scope over which longer-cycle trends may be observed (e.g., loss of seasonal ice cover), yet is short enough to allow "reasonable" projections of changes in "use patterns" in an area, as well as exogenous factors (e.g., world supply and demand for petroleum, U.S. inflation rate trends) that may be influential.

The analysis recognizes that diminishing sea ice is a trend with longer-cycle impacts beyond the 10-year period. Although not quantified or analyzed in detail due to the high level of uncertainty regarding longer-term environmental conditions and future activities, discussion is included regarding the potential types of costs and benefits that may accrue beyond the 10-year timeframe.

2.6 Potentially Affected Economic Sectors and Groups

The following is a brief listing of the economic sectors and groups potentially affected by Arctic ringed seal CHD in that participants in these sectors may seek some Federal action that requires consultation under Section 7 of the ESA. **Section 6** of this document analyzes the costs and benefits of CHD to these sectors and groups, while **Section 7** is an IRFA of potential impacts to small entities within these sectors. The potentially affected economic sectors and groups include:

> Oil and Gas Sector. There are exploration, development, and production of oil and gas resources within and adjacent to proposed Arctic ringed seal CH in the Chukchi and Beaufort Seas.

> Mining Sector. There are in-water dredging mine sites near Nome as well as mines that depend on the use of a port terminal near Kotzebue.

> Ports. There are several public ports in proposed Arctic ringed seal CH waters, including the Port of Nome, Port of Kotzebue, and the DeLong Mountain Terminal Port.

> Commercial Fishing. There is commercial fishing of finfish and shellfish in the southern areas of proposed CH within the Bering Sea.

> Alaska Native Subsistence Use and Personal Use. Alaska Native peoples and non-Native residents of Native communities in the region participate in subsistence use activities in nearshore areas of proposed CH, including hunting and fishing.

> Recreation and Tourism. A limited but increasing number of cruise ships bring tourists to proposed CH waters both south and north of the Bering Strait. There are also limited recreation/tourism activities such as fishing and wildlife viewing taking place in nearshore CH waters and areas adjacent to CH waters.

> Commercial Shipping and Marine Transportation. Commercial vessels transiting proposed CH waters during ice-free summer months include oil tankers, cargo vessels, research vessels, fishing vessels, and cruise ships.

> Military Activities. Military activity in and adjacent to proposed CH waters includes marine vessel and aircraft traffic, use of sonar and radar, emergency response, icebreaking, and training exercises.

> Educational/Scientific/Passive Users. Research on Arctic ecosystems is occurring, and there is interest by educational/scientific/passive users in increased scientific knowledge about, and preservation of, the Arctic environment within proposed CH.

2.7 Information Sources

The primary sources of information for this report are communications with, and data provided by, personnel from NMFS, other Federal action agencies, non-governmental organizations, potentially affected private parties, and State and municipal agencies. Specifically, the analysis relies on data collected from the following entities:

> Alaska Department of Environmental Conservation
> Alaska Department of Fish and Game, Division of Harvest
> Alaska Department of Fish and Game, Division of Subsistence
> Alaska Department of Natural Resources, Division of Oil and Gas
> Alaska Department of Labor and Workforce Development
> Alaska Industrial Development and Export Authority
> Arctic Slope Regional Corporation
> Bering Straits Native Corporation
> Bureau of Ocean Energy Management
> Calista Corporation
> Kotzebue Chamber of Commerce
> NANA Regional Corporation
> Nome Chamber of Commerce
> Nome Convention and Visitors Bureau
> Nome Discovery Tours
> Port of Nome
> Port of Kotzebue
> Teck Resources Limited
> U.S. Army Corps of Engineers
> U.S. Bureau of Economic Analysis
> U.S. Census Bureau
> U.S. Coast Guard
> U.S. Fish and Wildlife Service
> U.S. National Oceanic and Atmospheric Administration Fisheries Service
> Zazu Metals Corporation

In addition, this analysis relies upon the MMPA consultation history of NMFS, as well as public comments, and published journal sources.

3 Types of Economic Costs of Critical Habitat Designation

This section presents the different types of economic costs that may stem from the CHD. These costs are categorized as direct and indirect costs.

3.1 Direct Costs

The direct, incremental costs of CHD stem from the consideration, during Section 7 consultations, of the potential for destruction or adverse modification of CH. The two categories of direct incremental costs of CHD are: 1) the administrative costs of conducting Section 7 consultation; and 2) implementation of any project modifications requested by NMFS through Section 7 consultations to avoid or minimize potential destruction or adverse modification of the CH.

3.1.1 Administrative Section 7 Consultation Costs

Parties involved in Section 7 consultations for Arctic ringed seals include NMFS,[37] in its role as "consulting" agency, a Federal "action" agency (i.e., the Federal action, such as a permit or other authorization, provides the "Federal nexus" requiring consultation), and in some cases, a private (or non-Federal public) entity involved in the project or use activity. The Federal action agency serves as the liaison with NMFS. While consultations are required for activities with a Federal nexus that may affect a listed species, regardless of whether CH is designated, the CHD may increase the cost and complexity of consultations in cases where the project or activity in question may adversely modify CH. Administrative expenditures associated with consultation may, therefore, result in both baseline and incremental costs.

For contextual purposes, **Table 3-1** presents generalized per-event administrative costs of consultations. In general, three different scenarios associated with the CHD may trigger incremental administrative consultation costs:

1. **Additional effort to address adverse modification in a new consultation** - New consultations taking place after CHD may require additional effort to address CH issues, above and beyond the listing issues. In this case, only the additional administrative effort (i.e., expenditure of resources) required to address CH is considered an incremental cost of the CHD.
2. **Re-initiation of consultation to address CHD** - Consultations that have already been completed on a project or activity may require re-initiation, specifically to address CH considerations. In this case, the costs of re-initiating the consultation, including all associated administrative and project modification costs, are appropriately attributed to the CHD.
3. **New consultation resulting entirely from CHD** - CHD may trigger consultations that would not have occurred, absent the designation (e.g., for an activity for which adverse modification may be an issue, while jeopardy is not). All associated administrative and project modification costs of incremental consultations are considered directly attributable to the CHD.

The administrative costs of these consultations vary, depending on the specific details of the project. One way to address this variability is to show a range of possible costs of consultation. **Table 3-1** provides estimated mid-point consultation costs representing effort required for all types of consultation, including

[37] In cases where federal management actions governing fisheries are proposed that "may adversely modify" CH, NMFS may be both the "action" agency and the "consulting" agency, although different Divisions within NMFS would perform these respective roles.

those that consider both adverse modification and jeopardy. To estimate the fractions of the total administrative consultation costs that are baseline versus incremental, the following assumptions were applied:

> Efficiencies exist when considering both jeopardy and adverse modification at the same time (e.g., in staff time saved for project review, logistical expenses, data gathering and synthesis, and report writing) and, therefore, incremental administrative costs of considering adverse modification in consultations that will already be required to consider jeopardy, result in the smallest attributable incremental expenditure of these three consultation categories, roughly half that of a re-initiation.

> Incremental costs of a re-initiation of a consultation, because of the CHD, are assumed to be approximately half the cost of the original consultation that considered only jeopardy. This assumes that re-initiations are less time-consuming, as the groundwork for the project has already been considered in terms of its effect on the species (i.e., jeopardy standard);

> Costs associated with an incremental consultation (one occurring because of the designation of CH) would be attributed wholly to CHD;

> It is important to note that the estimated costs represent the mid-point of a potential range that may result from different levels of effort for specific consultations.

Table 3-1 Example Range of Attributable Costs per Consultation (by Administrative Type in 2012 dollars)

Consultation Area	NMFS	Federal Agency	Third Party	Total Costs
Additional Effort to Address Adverse Modification in a New Consultation				
Technical Assistance	$200	$300	400	$900
Informal Consultation	$600	$1,800	$5,000	$7,400
Formal Consultation	$1,400	$2,900	$15,000	$19,300
Programmatic Consultation	$4,300	$5,000	N/A	$9,300
Re-Initiation of Consultation to Address Adverse Modification				
Technical Assistance	$300	$600	400	$1,300
Informal Consultation	$1,300	$3,800	$5,000	$10,100
Formal Consultation	$2,800	$5,800	$15,000	$23,600
Programmatic Consultation	$8,600	$10,100	N/A	$18,700
Incremental Consultation Resulting Entirely from Critical Habitat Designation (Listing does not trigger consultation)				
Technical Assistance	$600	$1,100	400	$2,100
Informal Consultation	$2,600	$7,500	$5,000	$15,100
Formal Consultation	$5,700	$11,500	$15,000	$32,200
Programmatic Consultation	$17,100	$20,200	N/A	$37,300

Source: Industrial Economics, Inc. analysis of full administrative costs, based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2008; a review of consultation records from several U.S. Fish and Wildlife Service field offices across the country, conducted in 2002; and modifications by NMFS for Alaska and to take account recent cost estimates associated with USFWS polar bear consultations.

Acronym: N/A – not applicable.

Note: Estimates reflect average hourly time required by staff. Totals may not sum due to rounding.

3.1.2 Section 7 Project Modification Costs

Section 7 consultations considering CH may also result in additional project modification recommendations, specifically addressing potential destruction or adverse modification of CH. For consultations considering jeopardy and adverse modification, as well as re-initiations of past jeopardy consultations to consider CH concerns, the economic costs of project modifications, undertaken specifically to avoid destruction or adverse modification of CH, are attributable as incremental costs of CHD. If a jeopardy or adverse modification determination is made, the biological opinion must identify reasonable and prudent alternatives (RPAs), if any, that would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of CH and that are economically and technologically feasible. The action agency may choose to 1) implement an RPA, 2) modify the proposed action and consult with NMFS again, 3) decide not to authorize, fund, or otherwise proceed with the action, or 4) apply for an exception, a process rarely undertaken.

Costs of associated project modifications assumed to be attributable to CHD differ by consultation type. This is summarized below.

1. **Additional effort to address adverse modification in a new consultation** - Only project modifications associated solely with avoiding adverse modification are considered incremental.
2. **Re-initiation of consultation to address adverse modification** - Only project modifications associated solely with avoiding adverse modification are considered incremental.
3. **Incremental consultation resulting entirely from CHD** - Costs of all project modifications are considered incremental.

3.2 Indirect Costs

CHD may, under certain circumstances, affect actions that do not have a Federal nexus and, thus, are not subject to the provisions of Section 7 under the ESA. Indirect costs are those changes in economic behavior that may occur outside of the ESA, through other Federal, State, or local actions that are motivated by the CHD. This section identifies common types of indirect costs that may be associated with the CHD. Importantly, these types of costs are not always considered incremental. In the case that these types of conservation efforts and economic effects are expected to occur regardless of CHD, they are appropriately considered baseline costs.

3.2.1 Other State and Local Laws (Trigger Effects)

Under certain circumstances, CHD may provide new information to a community or political jurisdiction about the sensitive ecological nature of a geographic region, potentially triggering additional economic effects under state or local laws. In cases where these effects would not have been triggered in the absence of a CHD, they are appropriately considered indirect, incremental effects of the designation, for purposes of the RIR.[38]

3.2.2 Time Delays

Both public and private entities may incur incremental delays associated with projects and other activities, due to requirements associated with the need to reinitiate the Section 7 consultation process and/or comply with other laws triggered by CHD. To the extent that delays result from the CHD, they are appropriately attributable as incremental costs of the designation.

[38] Enhanced scientific information and understanding of sensitive ecological assets also yield benefits to society, facilitate sustainable management, and reduce risks that uninformed actions will impose subsequent high mitigation costs, or result in irreparable damage.

3.2.3 Regulatory Uncertainty

NMFS conducts Section 7 consultations on a case-by-case basis, and issues a biological opinion on formal consultations, based on species-specific and site-specific information. As a result, Federal government agencies, and private parties who seek permits or other authorization from those agencies, consult with NMFS under Section 7, and may face uncertainty concerning whether project modifications will be recommended by NMFS and, if so, what the nature of such modification recommendations may be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of CHD on specific activities. Where information suggests that this type of regulatory uncertainty, stemming from CHD, may affect a project or allied economic behavior, associated costs are considered indirect, incremental results, attributable to the CHD.

4 Types of Economic Benefits of Arctic Ringed Seal Critical Habitat Designation

Various economic benefits may result from the long-term species and habitat conservation associated with designating CH. As discussed in detail in **Section 6** of this report, NMFS does not anticipate that the proposed Arctic ringed seal CHD will result in any incremental project modification requirements above and beyond those that would be required due to the threatened status of the species. However, benefits of CHD are expected due to enhanced awareness of the habitat features essential to conservation (EFs), including knowledge of their location. Prior to consultation, this awareness may influence the design, location, or other aspects of proposed projects or activities in ways that benefit conservation of the species and its habitat. Benefits of the proposed CHD are thus expected to accrue related to education, scientific knowledge, and passive-use values. As discussed below, benefits may also extend to direct uses, such as those associated with the region's subsistence-based economy, tourism, wildlife viewing and filming; and to indirect uses such as commercial or sport fishing.

To provide context to the economic cost analyses discussed in subsequent chapters, this section describes the types of economic benefit that may accrue from conservation of Arctic ringed seal CH, and reviews information from the economic literature on the potential value of these types of benefits. The studies reviewed in this section are not specific to Arctic ringed seals or the question of economic benefits of conservation of this species or its habitat. Consequently, these values cannot be directly used to estimate the economic benefits of Arctic ringed seal CHD. Rather, the literature and values cited in this section provide a general sense of the possible magnitude of the use and non-use benefits individuals and society derive from the attributes provided by resources such as Arctic ringed seal CH. **Unless otherwise noted, values from the studies reviewed in this section are adjusted to 2012 dollars for comparison purposes.**[39]

This section includes four subsections. The first subsection provides a brief overview of the types of use and passive use benefits that may arise from Arctic ringed seal CHD, the second subsection presents examples from the peer-reviewed literature on the value of use benefits, the third subsection presents examples from the literature on passive use benefits, and the final subsection provides a brief summary of the benefits that may accrue from proposed CHD.

It is important to note that many of the values that are associated with the CHD are non-market, meaning that they cannot be directly measured in the marketplace (as with typical economic goods and services that have a market price), but rather must be ascertained either indirectly through observing the behavior of people (i.e., revealed preference), or directly through asking people how much they value the resource (i.e., stated preference).

4.1 Categories of Arctic Ringed Seal CH Benefits

The benefits generated by a natural resource, such as Arctic ringed seal CH, can be classified into several categories (see **Figure 4-1**). One important distinction is between use benefits that are generally associated with people's present use of the habitat resource, and nonuse (or passive use) benefits that do not require present use and, instead, are derived through the knowledge that Arctic ringed seals and their habitat exist and, if threatened, steps are being taken for their protection. Within the use and nonuse benefit categories there are further subcategories, which are described below. Economists differ on the ways that these values are organized, in terms of use and nonuse classification, and sub-classifications.

[39] Bureau of Labor Statistics. Consumer Price Index (CPI) Inflation Calculator. Website: http://www.bls.gov/data/inflation_calculator.htm.

However, as the aim of this analysis is to account for all potential benefits, the specific categorical labels are less important than ensuring that all types of potential benefits accruing from the proposed Arctic ringed seal CHD are identified and addressed.

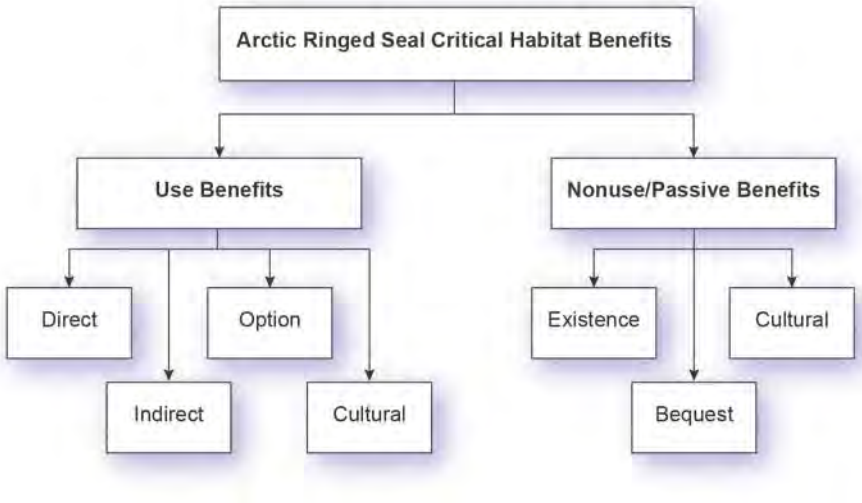

Figure 4-1 Types of Benefits of the Proposed Arctic Ringed Seal CHD

In addition to the categories shown in **Figure 4-1** above, economic benefits arising from the use and passive use of Arctic ringed seal CH can be divided into consumptive and non-consumptive uses. Consumptive use or extraction benefits of the Arctic ringed seal CH primarily consists of subsistence use by Alaska Natives. Non-consumptive uses, which are uses associated with a good or service independent of its consumption, include use benefits from public education, and scientific study and associated literature, as well as passive use benefits (e.g., values associated with the existence of the Arctic ringed seal CH for present and future generations). There are also potential non-consumptive direct use benefits related to wildlife watching, photography, etc.

Previous economic studies have estimated the economic value of the types of benefits that could accrue from CHD. A selection of these studies is reviewed below for each primary type of use value or activity associated with CHD, including subsistence values, wildlife viewing, fishing, education, and scientific knowledge.

4.2 Use Benefits

Use benefits are described below in four distinct (i.e., additive), but related, categories: direct, indirect, option, and cultural. Direct use value would accrue from any positive change in the level of utility (e.g., enjoyment or profitability) accruing from activities enhanced by CHD. For example, compared to the "without CHD" conditions, the designation of CH could increase the value of wildlife viewing, including but not limited to, observing the Arctic ringed seal and other marine species. Waters in the proposed Arctic ringed seal CHD support and sustain a myriad of species, including several other ESA-listed species, such as polar bears, several species of great whales, and Steller sea lions that people gain utility from viewing. Viewing marine species (e.g., birds, as well as mammals) is highly valued as a primary component of the aesthetic reward, cultural heritage, and benefits associated with living in and visiting Alaska.

Indirect use values are derived from using a resource that is enhanced by the proposed Arctic ringed seal CH, such as changes in target fish populations. For example, if CHD enhances fish abundance of a target species, then anthropogenic uses of that species (e.g., commercial, subsistence, personal use or recreational fisheries) may benefit. Because many fish species are highly migratory during their life-cycle,

these benefits may accrue to users in areas outside the proposed CHD. Indirect use benefits also include scientific and educational advancements attributable to the CHD. If the CHD results in new and enhanced scientific understanding of the biology of Arctic ringed seals or the impacts of human interactions, then natural resource managers and scientists, as well as the population as a whole, benefit in a number of ways. The proposed Arctic ringed seal CHD also may contribute to education, informing individuals on the biological and ecological implications of species preservation, as well as oceanographic and climatological changes in the Arctic.

Option use values derive from the preservation of the opportunity for future use of a resource. The designation of Arctic ringed seal CH has the potential to sustain the option for individuals to 'use' (i.e., access) the species and its habitat in the future. Conceptually, option value reflects an individual's WTP to avoid foreclosing future access to a resource or activity. Here, WTP reflects the current value to an individual of preserving the opportunity, at some unspecified point in the future, of 'using' (in the broadest sense of that term) Arctic ringed seal CH.

Cultural values can be derived from both use and non-use of the resource. Cultural values do not readily lend themselves to monetary measurement or approximation as they are specific to each group of people. Economic monetization, in general, is typically based upon the premise that markets exist, or at least, can be approximated, within which trade can occur between two parties. This is not a valid assumption in the case of cultural values. Nevertheless, changes in individual well-being connected with enhanced cultural welfare of Native and other Alaska residents through protection of marine resources constitute real, potentially significant, economic benefits attributable to the proposed Arctic ringed seal CHD.

4.2.1 Direct Use Benefits

This section describes the types and potential magnitude of direct use benefits from CHD related to subsistence and wildlife viewing activities.

4.2.1.1 Subsistence

The economics of subsistence activities in Alaska have been studied with increasing intensity since the Exxon Valdez spill and resulting class action lawsuit by Alaska subsistence harvesters. Three methods are used to estimate the economic benefits of subsistence activities: 1) nutritional value, 2) replacement cost, and 3) non-market valuation.[40] Depending on the method of estimation, estimates of the value of subsistence harvest range from $4 to $280 per pound. The replacement cost method was ultimately used to value Alaska Native subsistence losses in the case of the Exxon Valdez.[41] It is important to note that replacement cost does not take into account the cultural and/or social value of subsistence activity. Thus, replacement cost represents, at best, a lower bound estimate of the value of subsistence activity.[42]

In his 1997 publication, John Duffield reviewed the research that led up to the valuation of Alaska Natives' subsistence harvest following the Exxon Valdez spill. The studies included: (a) a 1987 pre-spill study[43] that estimated the value of Alaska subsistence harvest at $280 per pound, based on the tradeoff between

[40] Colt, Steve. 2001. *The Economic Importance of Healthy Alaska Ecosystems*. Institute of Social and Economic Research University of Alaska Anchorage. Alaska Conservation Foundation.

[41] Duffield, John. 1997. Nonmarket Valuation and the Courts: The Case of the Exxon Valdez. *Contemporary Economic Policy*-15.

[42] Colt, Steve. 2001. The Economic Importance of Healthy Alaska Ecosystems. Institute of Social and Economic Research University of Alaska Anchorage. Alaska Conservation Foundation.

[43] Wolfe, Robert J. and Robert J. Walker. 1987. Subsistence Economies in Alaska: Productivity, Geography, and Development Impacts. *Arctic Anthropology*-24. As reported in Duffield, John. 1997. Nonmarket Valuation and the Courts: the Case of the Exxon Valdez. *Contemporary Economic Policy*-15.

subsistence use and income, and (b) a 1993 study[44] that, using the same data as the 1987 study (from the Alaska Subsistence Division on subsistence activities in 98 Alaska communities), estimated the economic value of subsistence harvest at $72 per pound.

For settlement purposes in the Exxon Valdez case, the defendants presented the economic value of subsistence harvest at $16 per pound, based on replacement cost. The plaintiffs provide a range of $19 to $21 per pound for the replacement cost of subsistence harvest. The damages awarded to the plaintiffs for subsistence harvest was within the plaintiffs' range of proposed replacement costs.[45]

Subsistence use in Arctic Alaska is widespread, benefiting almost all residents. The Alaska Department of Fish and Game (ADF&G), Division of Subsistence, estimated in 2010 that 96 percent of Arctic Alaskan households used fish and 92 percent used game that is procured through subsistence activities.[46] In terms of subsistence participation, it was estimated that approximately 78 percent of households participated in subsistence fish harvests and 63 percent participated in subsistence game harvests. In terms of nutritional and replacement value, ADF&G estimated that the 24, 271 Arctic Alaska residents in rural areas harvest approximately 10,592,409 pounds of useable wild food annually, with replacement value in 2012 dollars of between $3.9 million to $7.8 million.[47] Using the values cited above from Duffield (1997) of $72 to $280 per pound, the value of the 2010 rural Arctic Alaska harvest could be in the range of $762.7 million to $2.966 billion (in 2012 dollars). A number of communities in the western region of Alaska also participate in subsistence harvest of fish and game, and so the estimate for Arctic residents provides a minimum indication of the value of subsistence harvest in communities adjacent to the proposed Arctic ringed seal CH.

4.2.1.2 Subsistence Hunting / Cultural Use

Alaska Natives living along the Bering, Chukchi, and Beaufort seas rely on ice seals for food, clothing, equipment, and handicrafts.[48] In addition to providing nutritional sustenance and materials, hunting ice seals is culturally important to Alaska Natives. As described by Sue 'Ainana' Steinacher, subsistence hunting is about identity, learning, patience, self-reliance, belonging, family, community, and nourishing bodies, family, and spirit.[49]

Hunting seals and other animals provides people and the community a connection to each other and an identity as Native people. Seal hunting is also important because it brings people in the community together, to share and celebrate.[50] Measures to conserve Arctic ringed seal CH could result in enhanced Arctic ringed seal populations or species health, which in turn, could contribute to maintaining or enhancing Alaska Native subsistence activities associated with this species.

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44 Hausman, Jerry A. 1993. Report of Professor J. A. Hausman. Presented at the Exxon Valdez consolidated court case, as reported in Duffield, John. 1997. Nonmarket Valuation and the Courts: the Case of the Exxon Valdez. *Contemporary Economic Policy*-15.

45 Duffield, John. 1997. Nonmarket Valuation and the Courts: the Case of the Exxon Valdez. *Contemporary Economic Policy*-15.

46 Alaska Department of Fish and Game; Division of Subsistence. 2010. *Subsistence in Alaska: A Year 2010 Update*. Website: http://www.adfg.alaska.gov/static/home/library/pdfs/subsistence/subsistence_overview2010.pdf.

Arctic Alaska is not defined in the publication, but is one of seven rural areas of Alaska described in the publication. The other six rural areas are: Southcentral, Kodiak Island, Southeast, Southwest-Aleutian, Interior, and Western.

47 The study uses a range of $3.50 to $7.00 as the replacement cost per pound; updated to 2012 values this range is $3.69 to $7.37.

48 Alaska Department of Fish and Game. 2007. *A Student Guide to Seal Hunting and Safety (grades 4-6): Yup'ik Region*. Website: http://www.adfg.alaska.gov/static/education/educators/curricula/pdfs/ice_seal_student_guide.pdf.

49 Ibid.

50 Ibid.

Similarly, any increases in Arctic ringed seal populations due to CHD may also benefit marine mammal species important to subsistence hunting that prey on Arctic ringed seals, such as polar bears. Polar bear populations are known to fluctuate with prey abundance (Stirling and Lunn 1997), and local declines in ringed seal numbers and productivity have resulted in marked declines in polar bear populations (Kelly, et.al. 2010).[51] If conservation of the Arctic ringed seal CH results in enhanced conservation of other species that are important to Alaska Native subsistence users, such as polar bear, walrus, whales, sea lions, and other ice seals, then this may similarly contribute to maintaining or enhancing Alaska Native subsistence activities.

4.2.1.3 Wildlife Viewing and Sightseeing

The Arctic ringed seal and other Arctic wildlife populations, including a wide variety of bird species, walrus, polar bears, sea lions, whales, and other seal species, are valued for wildlife viewing, photography, and sightseeing. Viewing of these species is marketed as an attraction for tourism cruises within proposed Arctic ringed seal CH waters. These cruises are, at present, limited in number, and Arctic ringed seal habitat is remote and difficult to access, but their frequency may increase with continued sea ice diminishment. Arctic ringed seal CHD would be expected to maintain or improve wildlife viewing opportunities, which would benefit wildlife viewers.

There are no known studies of the economic value of wildlife viewing in Arctic Alaska. This section instead considers a study on seal viewing in England, as well as a study that summarized the value of other types of wildlife viewing in several different parts of Alaska. These studies illustrate the type of values for wildlife viewing that have been estimated in other contexts; as these contexts are quite different from Arctic Alaska, **these values cannot be applied to estimate the value of wildlife viewing experiences within the proposed CH**. Nonetheless, these estimates demonstrate that such non-consumptive use values do exist, can be meaningfully measured with sufficient resources and effort, and may represent important sources of utility (i.e., benefits) to users.

A working paper by Valentina Bosetti and David Pearce[52] used the CV method to estimate the economic value of seal conservation, focused on the Cornish Grey Seal population in southwest England. The study found a mean WTP of about $16[53] per person per year to view seals in a sanctuary and a slightly higher WTP of $18 per person per year to view seals in the wild. While this paper measures the value of viewing a different species, to residents of a different country, it indicates that some people derive value from the experience of viewing seals, and may derive increased value from doing so in the seal's natural habitat.

Loomis (2005) compiled a database of over 1,200 benefit estimates of outdoor recreation, including eight studies estimating the benefits of wildlife viewing on Alaska National Forest and other public lands.[54] There was significant variation in the estimated value per trip day (recreation, of any length of time, occurring within a one-day period), with net benefits (consumer surplus) ranging from $13 to $109 per trip day, with an average of $60 per trip day. This variation is due, in part, to use of different methodologies that may produce differing value estimates for very similar wildlife viewing experiences. This range of values also underscores the fact that the value of wildlife viewing may vary significantly, based on such factors as the species being viewed, site characteristics, and demographics of the wildlife viewers. The

[51] Kelly, B.P., J.L. Bengtson, P.L. Boveng, M.F. Cameron, S.P. Dahle, J.K. Jansen, E.A. Logerwell, J.E. Overland, C.L. Sabine, G.T. Waring, and J.M. Wilder. 2010. Status Review of the Ringed Seal (*Phoca hispida*).

[52] Bosetti, Valentina, and David Pearce. 2003. A Study of Environmental Conflict: The Economic Value of Grey Seals in Southwest England. *Biodiversity and Conservation*-12:12.

[53] One British pound = $1.625946 on 1/1/2003. Website: http://www.x-rates.com/historical/?from=EUR&amount=1.00&date=2013-01-01

[54] Loomis, John. 2005. Updated Outdoor Recreation Use Values on National Forests and Other Public Lands. *USDA Forest Service General Technical Report PNW-GTR-658*.

relevant information to draw from these analyses, as it bears on the proposed CHD, is that these non-consumptive uses have real, and potentially substantial, economic value.

4.2.2 Indirect Use

This section discusses the types and potential magnitude of indirect use benefits from CHD, including those related to fishing, environmental education, and scientific knowledge.

4.2.2.1 Fishing [Recreational, Commercial, Subsistence, Personal Use]

Fishing benefits may result from the proposed CHD, as protection of Arctic ringed seal CH may also benefit fish populations important for commercial, subsistence, recreational, and person-use fisheries. Because many fish species are highly migratory during their life-cycle, benefits may accrue to fisheries and anglers beyond the boundaries of the proposed CH.

The economic benefits of fishing have been studied extensively by economists, resulting in a wide range of value estimates. There are numerous studies of the value of recreational fishing in Alaska, but NMFS is not aware of studies of the value of recreational fishing within the proposed CH. (Values from other locations have not been applied to fishing in the proposed CH as the fishing experience, and thus its value, may widely differ between locations.) For example, the 2005 study by Loomis,[55] referenced above, included four values for recreational fishing in Alaska. The net benefits per fishing day estimated in these Alaska studies ranged from $56 to $100 (with an average value of $76), with variation based on differences in such attributes as location and the angler population. Personal use fishing and subsistence use fishing are also widespread throughout Alaska, including Arctic Alaska, see discussion above in **Section 4.2.1.1** on the prevalence and value of subsistence fishing activities in Arctic Alaska.

While there is currently no Federally-managed commercial fishing in the Chukchi Sea or Beaufort Sea due to limited data on fish populations in these waters, there is some commercial harvest in the areas of the northern Bering Sea within the proposed Arctic ringed seal CH. The gross ex-vessel value of harvest in this area, from State and Federally managed fisheries combined in 2011, was estimated at approximately $27 million. In Bering Sea waters to the south of proposed CH, there is extensive, year-round commercial fishing. For example, in 2011, the total ex-vessel value of commercial groundfish fishing in the Bering Sea and Aleutian Islands Management Area was estimated at over $758 million (see **Section 5.4.4** for more detail).

4.2.2.2 Environmental Education and Scientific Knowledge Benefits

Arctic ringed seal CHD may lead to scientific and educational benefits. If CHD results in new and enhanced scientific understanding of the biology of Arctic ringed seals or their habitat, then natural resource managers and scientists, as well as the public as a whole, benefit in a number of ways. For example, improvements in documenting and inventorying geological, oceanographic, hydrological, and ecological aspects of the proposed CH areas may address questions about finfish and shellfish communities, stock abundance, growth and distribution patterns, or the potential for commercially harvestable surpluses. There may be advances in energy production, transportation, or alternative technologies. It may be possible to more precisely and accurately monitor changes of all types taking place in the Arctic environment. Increased knowledge may also contribute to public education, informing individuals, communities, organizations, and governments (local, regional, state, and Federal) of the biological, ecological, social, and economic implications of human actions.

Empirical research reports indicate that environmental education and increased scientific knowledge can provide substantial benefits to individuals and society as a whole. Many economic studies focus on the

[55] Loomis, John. 2005. Updated Outdoor Recreation Use Values on National Forests and Other Public Lands. *USDA Forest Service General Technical Report PNW-GTR-658*.

value of general education, including wage, health, and improved social relationship benefits. However, studies specifically focusing on the benefits of environmental education and increased scientific knowledge, such as those that may accrue from CHD are few. Still, one study by Dalrymple (2003) highlighted the value to society of increasing public access to scientific knowledge. Dalrymple described scientific knowledge as a public good, with importance to the economy and innovation.[56]

Stakeholders often seek to inform and/or influence the political process of any measure pertaining to species conservation by developing and disseminating pertinent scientific information. The individuals involved in these efforts (e.g., marine mammal researchers, natural resource economists, non-profit organizations, trade and industry groups, and conservation groups) are presumed to derive net welfare gains from their participation in such activities. Examples of these types of efforts include scientific studies and monitoring of Arctic ringed seal populations and habitat; informing public resource management policy development, decision-making, and implementation; public education campaigns; and informational lobbying.

4.3 Nonuse or Passive Use Benefits

Natural resources also have value to society, independent of their use. The CHD is intended to fulfill NMFS's obligations under the ESA, which was enacted in 1973. The purpose of the ESA is to protect and recover threatened and endangered species and the habitats on which they depend. In passing the act, Congress recognized that our natural heritage is of "aesthetic, ecological, educational, recreational, and scientific value to our Nation and its people". The primary benefit of the CHD and other baseline regulations protecting the Arctic ringed seal and its habitat is, thus, the value accruing to the public of fulfilling the ESA national policy of species conservation and recovery.

Nonuse values can include, among others, existence, bequest, and cultural values. A number of peer-reviewed, empirical studies have sought to estimate society's value, or WTP, to protect rare species, unique habitats, or whole ecosystems. These nonuse or passive use values of species and/or their habitats, as they may pertain to the Arctic ringed seal CHD are identified and briefly discussed here. Existence value is defined as individual utility or well-being derived from the knowledge of the existence of a natural resource, without the expectation of any form of use. For example, the mere knowledge of the existence of a relatively few California condors in the wild may elicit a large WTP (i.e., generate a large benefit) to assure the continued existence of that species in its natural ecological setting. This benefit derived by an individual (i.e., WTP), may be substantial, even though the individual has no expectation of ever seeing the bird or visiting its habitat. The protections offered by the Arctic ringed seal CHD under the ESA could be expected to also elicit passive use values. Passive use values may accrue to residents of Alaska, as well as the Nation (as no interaction with the species is required for benefits, residents of other states that are interested in marine habitat conservation may also benefit).

Passive use benefits are also generated by the preservation for future generations of natural resources, such as plant and animal species, habitat, and ecosystems. It has been empirically demonstrated that individuals derive utility from the knowledge that society preserves resources, so that they will be extant for the next generation. These welfare gains, known as bequest value, represent an important conceptual element of passive use valuation. The potential change in the bequest value of Arctic ringed seals and their habitat due to conservation efforts is one element of the total benefit society may derive from CHD.

The intrinsic non-use benefit of habitat and wildlife conservation is difficult to measure. Attempts to measure total value (use and non-use) may use survey methods that elicit hypothetical or contingent values of WTP. Because of the technical challenges and cost associated with these methods, to the best

[56] Dalrymple, D. 2003. Scientific Knowledge as a Global Public Good: Contributions to innovation and the Economy. Found in J.M. Esanu and P.F. Uhlir (Eds.). The Role of Scientific and Technical Data and Information in the Public Domain: Proceedings of a Symposium. *The National Academies Press*.

of our knowledge, none has been performed assessing habitat valuation in the region being considered for designation under this action. While techniques, such as "benefits transfer", have been employed in resource valuation analyses elsewhere, we have intentionally not extrapolated value estimates derived in other contexts and locations to the Arctic ringed seal CHD analysis. This study does report some WTP values found in the literature, to provide some empirical context for understanding passive use estimates. We emphasize that the dollar amounts derived from empirical studies of other assets, in other locations, have no direct applicability to the passive use values deriving from Arctic ringed seal and/or the CH under consideration for designation.

The general, passive use research has found that the estimated value for a species tends to increase if it is a 'charismatic' and recognizable species, if it is a bird or mammal or fish, and if the survey respondent is a visitor or recreational user in the conservation location (i.e., would hold use values, as well as non-use values). WTP also varies, based on the percent change in the resource being evaluated and the survey design and method. Richardson and Loomis (2009) conducted a meta-analysis of 31 economic studies on the value of protecting U.S threatened or endangered species.[57] They found that annual WTP for the protection of rare, threatened, or endangered species ranged from $9 per Wisconsin household for the striped shiner (a fish) based on a 1984 survey, to $355 per Washington household for western Washington and Puget Sound migratory fish, based on a 1998 survey. Values cited in this study, all presented in 2012 dollars, highlight how estimates of value for a given species can vary, based on differences in levels of species protection, survey design, and survey population. For example, the annual WTP for northern spotted owl conservation ranged from $44 per Washington household for a 100% avoidance of loss (based on a 1987 survey), to $148 per U.S. household for a 50% increase in chance of survival (based on a 1990 survey).

Of particular relevance to the assessment of the intrinsic non-use economic value of conservation of Arctic ringed seals are non-market valuation studies that focus on estimating the public's WTP for protecting marine mammals in the U.S. Three of these studies, all using CV methods, are described here. In a 1985 study, Hageman estimated the willingness of California residents to pay for the protection of bottlenose dolphins, California sea otters, Northern elephant seals, gray whales, and blue whales. WTP to avoid a reduction in whale populations, determined through a mail survey, ranged between $49 and $65 per year per household (2012 dollars), depending on the species. Samples and Hollyer conducted an in-person survey of Hawaii residents to estimate their one-time WTP for protection of humpback whales and Hawaiian monk seals.[58] They found that the WTP, in terms of a one-time payment per respondent, for the protection of humpback whales ranged from $284 to $322; whereas, the one-time WTP for the protection of monk seals ranged from $140 to $234 per respondent. A third study conducted by Loomis and Larson (1994) used in-person interviews and household mail surveys of California residents and whale watchers to evaluate WTP for a 50 percent to 100 percent increase in whale stocks.[59] This study estimated that whale watching visitors to California were willing to pay $35 per year on average; whereas, California residents were willing to pay $22 to $25 per year per household.

The WTP values estimated in these studies suggest that there is likely a positive non-use value associated with conservation of Arctic ringed seals and protection of its habitat through designation, although the magnitude of this value cannot be quantified at this time.

[57] Richardson, Leslie and John Loomis. 2009. The Total Economic Value of Threatened, Endangered, and Rare Species: An Updated Meta-Analysis. *Ecological Economics*-68:5..

[58] Samples, K.C., Hollyer, J.R. 1990 Contingent Valuation of Wildlife Resources in the Presence of Substitutes and Complements. Found in: Johnson, R.L., Johnson, G.V. (Eds.). *Economic Valuation of Natural Resources: Issues, Theory, and Applications*. Westview Press.

[59] Loomis, John and Douglas Larson. 1994. The Total Economic Value of Increasing Gray Whale Populations: Results From a Contingent Valuation Survey of Visitors and Households. *Marine Resource Economics*-9.

4.4 Summary

There are numerous types of economic benefits that may accrue to residents living near the Arctic ringed seal proposed CH, and to citizens throughout the U.S. These benefits are expected to include enhanced education/public awareness and scientific knowledge, as well as passive-use values. Benefits may also extend to direct uses, such as, subsistence, commercial and sport fishing, and wildlife viewing/documenting. While the magnitude of many of these types of benefits has been studied, none of these types of benefits has been studied in direct association with the CHD for Arctic ringed seals. Further, in all cases, the types of economic benefits associated with CHD are partially co-extensive with listing the Arctic ringed seal as threatened. As a result, at this time sufficient economic information and scientific data are not available to accurately quantify the total economic benefits expected from CHD.

5 Contextual Information

This section presents information on the area of the Arctic ringed seal proposed CH and vicinity. First, the geographic area of analysis is introduced. Then, a socioeconomic profile of this area is presented. This is followed by the regulatory baseline. Finally, the present economic activities in the area and actions being taken to protect Arctic ringed seals are discussed and synthesized.

5.1 Geographic Scope (Study Area)

The geographic scope of the analysis includes the specific area proposed for designation as Arctic ringed seal CH. **Figure 1-1** in **Section 1** presents the boundaries of the proposed CHD. The analysis focuses on activities within or affecting this area, and presents costs and benefits at the lowest level of resolution feasible, given available data. Note that economic activities affecting (or affected by) CH may be sited outside of the boundaries of the proposed CHD (e.g., activities in shoreline areas in the vicinity of proposed CH, but outside the water); these activities are considered relevant to this analysis. Activities and projects that have the potential of affecting the EFs, but are located outside the boundaries of the CH, may trigger Section 7 consultation(s) under ESA.

5.2 Description of Affected Economies

This section describes the socioeconomic environment in the five coastal Alaska boroughs and U.S. census areas adjacent to the proposed CH. From south to north these are: Bethel Census Area, Wade Hampton Census Area, Nome Census Area, Northwest Arctic Borough,and North Slope Borough (hereafter, Study Area). For comparison, the section also presents socioeconomic data for the State of Alaska and the U.S. The focus of this section is the socioeconomic parameters that could be affected by the proposed CHD: demographic characteristics of local residents, and employment and income levels.

These data are presented in four subsections: 1) population trends and projections; 2) race and ethnicity; 3) income-related measures of social well-being; and 4) employment by major economic sector. The data used for the economic and socioeconomic analyses are the most recent available, published data from reliable sources.

5.2.1 Population Trends and Projections

Although the Study Area accounts for approximately 35 percent of total land area in Alaska, it has only seven percent of the total state population. The Bethel Census Area is the most populous borough/census area in the Study Area, with a population of approximately 17,000 people in 2010; followed by the Nome Census Area, with approximately 9,500 people in 2010; and the North Slope Borough with just over 9,400 people. Larger communities within the Study Area include Barrow (North Slope Borough, 4,212 people), Kotzebue (Northwest Arctic Borough, 3,201 people), Nome (Nome Census Area, 3,598 people), Hooper Bay (Wade Hampton Census Area, 1,093 people), and Kipnuk[60] (Bethel Census Area, 639 people).

As shown in **Table 5-1**, each borough/census area in the Study Area experienced growth in the number of residents between 1990 and 2010, ranging from 14.5 percent (Nome Census Area) to 29.9 percent growth (North Slope Borough). The significant increase in the North Slope Borough population over this time period can be attributed to families returning to the North Slope due to increased employment

[60] Bethel is a larger community within the Bethel Census Area, but Kipnuk is the largest coastal community bordering proposed CH.

opportunities.[61] The other boroughs/census areas experienced slower, but still significant population growth, especially during the 1990s, when the population grew by about 21 percent in Wade Hampton and about 18 percent in the Northwest Arctic Borough. Between 1990 and 2010, the population growth rate in the Study Area was 4.4 percent higher than the growth rate for the Nation, but was 1.3 percent less than the Statewide growth rate.

Table 5-1 Population and Population Growth, 1990 - 2010

Area	Population			Population Growth (%)		
	1990	2000	2010	1990 2000	2000 2010	1990 2010
Bethel Census Area	13,656	16,006	17,013	17.2%	6.3%	24.6%
Kipnuk	*470*	*644*	*639*	*37.0%*	*-0.8%*	*36.0%*
Nome Census Area	8,288	9,196	9,492	11.0%	3.2%	14.5%
Nome	*3,500*	*3,536*	*3,598*	*1.0%*	*1.8%*	*2.8%*
Wade Hampton Census Area	5,791	7,028	7,459	21.4%	6.1%	28.8%
Hooper Bay	*845*	*1,022*	*1,093*	*21.0%*	*6.9%*	*29.3%*
Northwest Arctic Borough	6,113	7,208	7,523	17.9%	4.4%	23.1%
Kotzebue	*2,751*	*3,082*	*3,201*	*12.0%*	*3.9%*	*16.4%*
North Slope Borough	5,979	7,385	9,430	23.5%	27.7%	29.9%
Barrow	*3,469*	*4,581*	*4,212*	*32.1%*	*-8.1%*	*21.4%*
Study Area Total	39,827	46,823	50,917	17.6%	8.7%	27.8%
State of Alaska	550,043	626,931	710,231	14.0%	13.3%	29.1%
U.S.	250,181,000	282,459,000	308,747,508	12.9%	9.3%	23.4%

Sources:

U.S. Census Bureau, Census 2010, Population Estimates, National and State Population Estimates.
U.S. Census Bureau, Census 2000 Summary File 3 – Sample Data.
U.S. Census Bureau, Population of Counties by Decennial Census: 1900-1990.

U.S. Census Bureau, 1990 Census of Population and Housing, Public Law 94-171 Data (Official), Age by Race and Hispanic Origin.

U.S. Census Bureau, 2010 Census, Profile of General Population and Housing Characteristics: 2010, 2010 Demographic Profile Data.

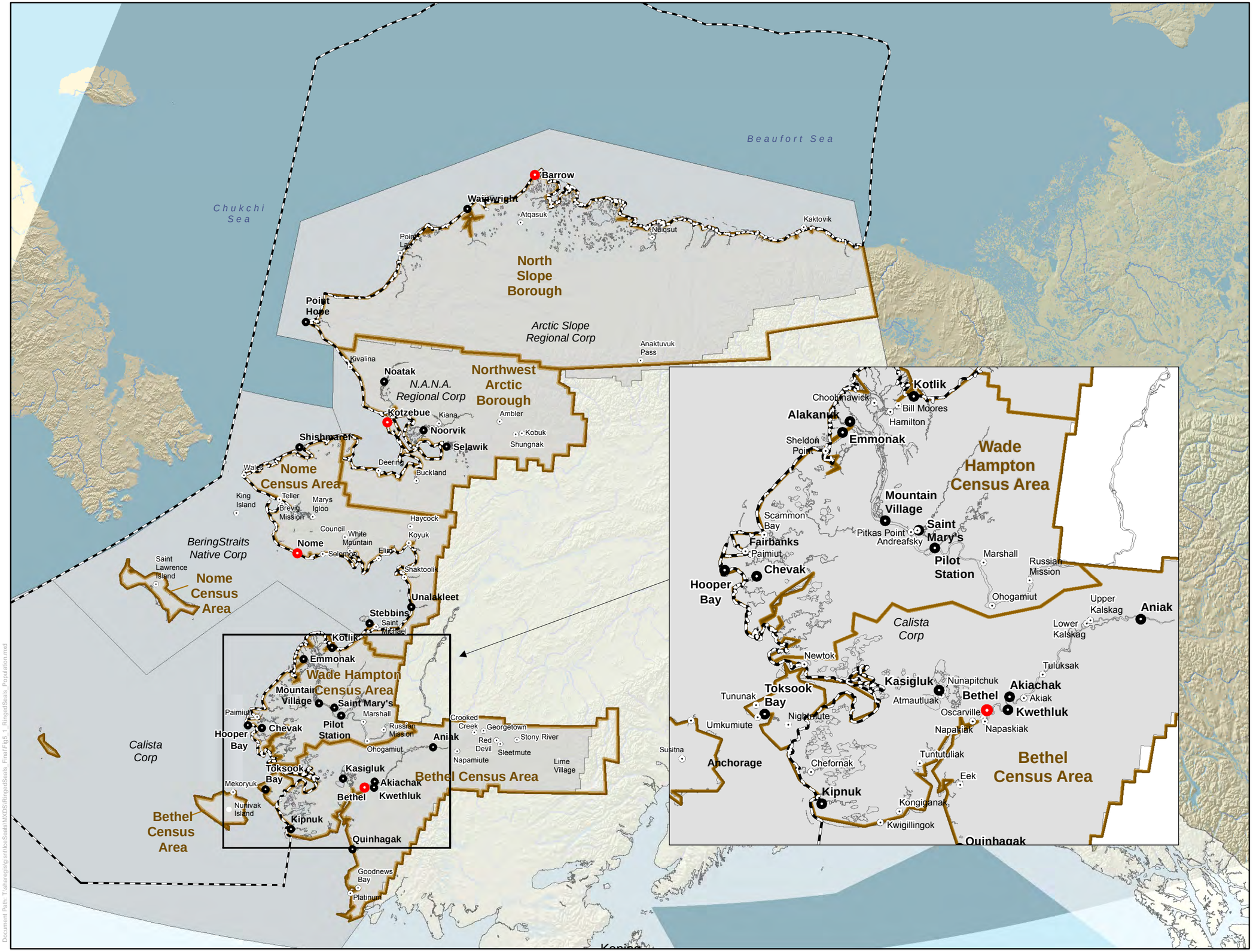
U.S. Census Bureau, 2000 Census, Profile of General Demographic Characteristics: 2000.

Community locations in the Study Area are shown in **Figure 5-1**. Communities with the largest populations are located on or near the coast.

[61] North Slope Borough. 2010. *North Slope Borough: Economic Profile and Census Report.* Website: http://www.north-slope.org/departments/mayorsoffice/2010_census/North%20Slope%20Borough.pdf. Accessed February 21, 2013.

Figure 5-1

Villages in Study Area by Population Size



Legend

Populated Places - Shoreline Area of Interest

- Population > 2000 people
- Population 500-2000 people
- Population < 500 people

Proposed Ringed Seal Critical Habitat

Borough/Census Areas

Native Corporation Boundaries

0 50 100
Miles

N

Data Sources: ASGDC, U.S. Census 2010

Cardno ENTRIX

Population projections through 2035 for residents of the five Study Area boroughs/census areas, the State of Alaska, and the U.S. are shown in **Table 5-2**. The total population across the Study Area is projected to grow throughout this time period, albeit with reductions in growth over time. Projected Study Area population growth rates are slightly higher than the National average, but generally lower than the State average (with the exception of the 2030-2035 time period). The population in the North Slope Borough is the only borough/census area in the Study Area without forecasted growth; the 2035 projected population is nearly identical to the 2010 population.

Table 5-2 Population Projections (2010-2035)

Area	Population				Population Growth (%)		
	2010	2020	2030	2035	2010 2020	2020 2030	2030 2035
Bethel Census Area	17,013	19,059	21,193	22,557	12.0%	11.2%	6.4%
Wade Hampton Census Area	7,459	8,606	9,909	10,759	15.4%	15.1%	8.6%
Nome Census Area	9,492	10,369	11,220	11,776	9.2%	8.2%	5.0%
Northwest Arctic Borough	7,523	8,185	8,865	9,302	8.8%	8.3%	5.0%
North Slope Borough	9,430	9,447	9,348	9,431	0.2%	-1.0%	0.9%
Study Area Total	50,917	55,666	60,535	63,825	9.3%	8.7%	5.4%
State of Alaska	710,231	802,762	879,823	915,211	13.0%	9.6%	4.0%
U.S.	308,747,508	333,896,000	358,471,000	369,662,000	8.1%	7.4%	3.1%

Sources:

Alaska Department of Labor and Workforce Development, Research and Analysis Section.

U.S. Census Bureau, Population Division, Projections and Components of Change for the United States: 2013 to 2060 (NP2012-T1).

The population statistics from the Census are for permanent residents of the Study Area and do not include non-resident workers. In 2011, according to the Alaska Department of Labor and Workforce Development, 68 percent of the workforce, or 21,639 workers, were not residents of the Study Area (See **Table 5-3**).[62] This non-resident worker population is equivalent to approximately 42 percent of the resident population in the Study Area. Non-resident workers are particularly prevalent in the North Slope Borough, where there are an estimated 16,575 non-local workers, largely employed in the oil operations and support services industries. In fact, in 2011 just 2.4 percent of workers in the mining sector (which includes the North Slope oil and gas operations) in the Northwest Arctic Borough, North Slope Borough, and the Nome Census Area were local residents. (Most non-resident North Slope oil and gas workers fly into Prudhoe Bay and work a one to two-week shift before returning home for a one to two-week break.)

[62] Alaska Department of Labor and Workforce Development. 2013. *2011 Residency of Alaska Workers.* Website: http://labor.alaska.gov/research/reshire/nonres.pdf.

Table 5-3 2011 Private Sector Workforce by Residency

Region	Local Residents	Non Local	Total Workers	Percent Non Local
Bethel Census Area	3,797	2,245	6,042	37.2%
Wade Hampton Census Area	1,072	364	1,436	25.3%
Nome Census Area	2,171	1,115	3,286	33.9%
Northwest Arctic Borough	1,746	1,340	3,086	43.4%
North Slope Borough	1,319	16,575	17,894	92.6%
Study Area Total	10,105	21,639	31,744	68.2%

Source: Alaska Department of Labor and Workforce Development, 2013, 2011 Residency of Alaska Workers.

5.2.2 Race and Ethnicity

The racial and ethnic compositions of the five boroughs/census areas in the Study Area, the State of Alaska, and the U.S. are presented in **Table 5-4** below.

Table 5-4 Population by Ethnic and Racial Groups (2006-2010 Average)

		Race							Ethnicity
Area	Population	White	Black	AIAN	Asian	Native Hawaiian or OPI	Other	Two or More Races	Hispanic or Latino[a]
Bethel Census Area	16,838	2,031 (12.1%)	44 (0.3%)	13,598 (80.8%)	133 (0.8%)	0 (0.0%)	0 (0.0%)	1,032 (6.1%)	227 (1.3%)
Wade Hampton Census Area	7,398	246 (3.3%)	9 (0.1%)	6,802 (91.9%)	14 (0.2%)	19 (0.3%)	0 (0.0%)	308 (4.2%)	30 (0.4%)
Nome Census Area	9,315	1,577 (16.9%)	105 (1.1%)	6,877 (73.8%)	28 (0.3%)	32 (0.3%)	38 (0.4%)	658 (7.1%)	105 (1.1%)
Northwest Arctic Borough	7,477	888 (11.9%)	17 (0.2%)	6,036 (80.7%)	41 (0.5%)	14 (0.2%)	6 (0.1%)	475 (6.4%)	97 (1.3%)
North Slope Borough	8,852	994 (11.2%)	37 (0.4%)	6,685 (75.5%)	233 (2.6%)	94 (1.1%)	33 (0.4%)	776 (8.8%)	332 (3.8%)
Study Area Total	49,880	5,736 (11.5%)	212 (0.4%)	39,998 (80.2%)	449 (0.9%)	159 (0.3%)	77 (0.2%)	3,249 (6.5%)	791 (1.5%)
State of Alaska	691,189	464,150 (67.2%)	22,655 (3.3%)	98,120 (14.2%)	36,021 (5.2%)	6,317 (0.9%)	9.833 (1.4%)	54,093 (7.8%)	38,393 (5.6%)
U.S.	303,965,272	224,895,700 (74.0%)	37,978,752 (12.5%)	2,480,465 (0.8%)	14,185,493 (4.7%)	491,673 (0.2%)	16,603,808 (5.5%)	7,329,381 (2.4%)	47,727,533 (15.7%)

Sources: U.S. Census Bureau, American Community Survey 5-Year Estimates: 2006-2010 Table DP05, accessed January 29, 2013

The predominant resident racial group in each borough/census area is American Indian or Alaska Native (AIAN), with 80.2 percent of the total Study Area population (compared to 14.2 percent Statewide). By borough/census area, the proportion AIAN ranges from 91.9 percent (Wade Hampton Census Area) to 73.8 percent (Nome Census Area).

With the exception of the Wade Hampton Census Area, the second largest racial group in each Study Area borough/census area is white, comprising 11.5 percent of the total resident Study Area population. Relative to statewide totals, there are few other minority groups in the Study Area.

5.2.3 Alaska Native Corporations and Communities

In 1971, President Richard Nixon signed into law the Alaska Native Claims Settlement Act (ANCSA). Under ANCSA, aboriginal financial and land claims were settled in exchange for $962.5 million in compensation, as well as approximately 40 million acres of land.[63] The ANCSA established twelve for-profit Alaska Native regional corporations (a thirteenth corporation was later added for Alaska Natives living outside the State), which administer the claims from the settlement. In addition, more than 200 Alaska Native village corporations were created. Both the regional and village corporations own land in and around Native villages, with ownership proportionate to the enrolled populations of these corporations during the 1970s. Surface rights to the land are owned by the village corporations, with subsurface rights controlled by regional corporations. In turn, the village and regional corporations are owned by enrolled Alaska Natives.[64] Approximately 80,000 Natives are enrolled under ANCSA, and receive 100 shares for the village corporation in which they are enrolled and the same amount for the regional corporation in which they are enrolled.[65]

Waters in proposed CH for the Arctic ringed seal are adjacent to land owned and managed by four ANCSA Regional Corporations and some of their related Village Corporations. These four ANCSA Regional Corporations are: the Arctic Slope Regional Corporation (ASRC), NANA Regional Corporation, the Bering Straits Native Corporation (BSNC), and the Calista Regional Corporation.

The ASRC represents the business interests of its approximately 11,000 Iñupiaq shareholders who primarily reside in the eight villages in the region.[66] Corporate headquarters are in Barrow, which, with 4,212 residents, is the largest village represented by the ASRC. Of Barrow residents, 61.2 percent identify themselves as AIAN.

The NANA Regional Corporation has more than 13,000 Iñupiaq shareholders. Within the NANA region there are approximately 7,500 people residing in eleven communities or villages.[67] The Alaska Native population in the region is approximately eighty-five percent Iñupiat Eskimos.[68] Kotzebue is the largest community in the Regional Corporation with over 3,200 residents, seventy-five percent of whom are Iñupiat Eskimos.[69]

The BSNC, headquartered in Nome, serves more than 6,700 shareholders.[70] Approximately 9,500 people reside in the BSNC region, of which approximately one-third reside in Nome (pop. 3,500). Areas in the north and west of the Corporation's Region are occupied by Iñupiat speakers, while the eastern and

[63] Norris, Frank. September, 2002, *Alaska Subsistence: A National Park Service Management History.* Alaska Support Office, National Park Service. U.S. Department of Interior, Anchorage, Alaska.

[64] Linxwiler, James D. 2007. *The Alaska Native Claims Settlement Act at 35: Delivering on the Promise.* Paper 12, 53rd Annual Rocky Mountain Mineral Law Institute.

[65] Census Bureau. 2010. American Community Survey 5-Year Demographic and Housing Estimates - 2007-2011.

[66] Arctic Slope Corporation. Website: http://www.asrc.com/About/Pages/Corporate.aspx.

[67] Nana Regional Corporation, Inc. Website: http://nana.com/regional/about-us/our-shareholders/.

[68] Ibid.

[69] Nana Regional Corporation, Inc. Website: http://nana.com/regional/about-us/overview-of-region/kotzebue/.

[70] Bering Straits Native Corporation, Website, Accessed at: http://www.beringstraits.com/. Accessed February 5, 2013

southern areas are the home of the Yup'ik. The Unaliq people occupy the coast margin of Norton Sound.[71]

The Calista Regional Corporation represents approximately 12,500 shareholders in Southwest Alaska, in a region located largely southeast of the proposed CH. The Calista Region includes approximately 56 villages (48 communities and 8 seasonally-occupied). Eighty-four percent of 24,472 people in the Calista Region identify themselves as Alaska Native (Yup'ik, Cup'ik, and Athabascan). The largest village represented by Calista, and located along the coast adjacent to the proposed Arctic ringed seal CH, is Hooper Bay (2010 population of 1,093), where 94.6 percent of residents identify themselves as AIAN.

5.2.4 Income-Related Measures of Social Well-Being

Per capita and median household income, poverty rates, and unemployment rates are widely used indicators of economic well-being. **Table 5-5** presents these socioeconomic data for the Study Area, the State of Alaska, and the U.S. In general, these indicators show that the Study Area has lower rates of economic well-being than other areas of the State of Alaska or the Nation, with higher overall unemployment and poverty, and lower per capita income. The exception to this is the North Slope Borough, which has higher per capita income and lower unemployment, but still has a higher poverty rate than the State average.

In 2011, per capita personal income in the Study Area averaged $35,672, less than the Statewide average of $45,665 and the National average of $41,560 (2011 dollars, see **Table 5-5**). Only in the North Slope Borough does per capita income ($48,447) exceed the Statewide average. Similarly, median household income in the North Slope Borough in 2011 was the highest in the Study Area at $76,667 (2011 dollars), exceeding the same figures for the other Boroughs/Census Areas in the Study Area (which range from $39,583 in Wade Hampton to $59,893 in Northwest Arctic), the Study Area as a whole ($55,822), and the State ($69,014). **Table 5-6** provides the trends in median household incomes from 1989 to 2011. As shown in the table, the Study Area median household income growth (78.9 percent) surpassed the growth rate for the State of Alaska (66.7 percent) but was slightly under the U.S. growth rate (75.5 percent).

A third indicator, poverty rate, represents the percentage of an area's total population living at or below the poverty threshold established by the U.S. Census Bureau. Based on available data for 2011, poverty rates for the boroughs/census areas within the Study Area, aside from the North Slope Borough, were higher (ranging from 19.6 percent to 30 percent) than the Statewide and National rates (9.5 percent and 14.3 percent, respectively).

Finally, the unemployment rate represents the percentage of the labor force that is unemployed and is actively seeking employment. In 2011, the North Slope Borough experienced an unemployment rate of 5.4 percent, the only Borough/Census Area in the study below the State and National levels (7.6 and 8.9 percent, respectively). The borough/census area unemployment rates elsewhere in the Study Area ranged from 12.3 percent (Nome Census Area) to 20.4 percent (Wade Hampton Census Area).

[71] Ibid.

Table 5-5 Income (2011 Dollars), Poverty Rates, and Unemployment Rates

Area	Per Capita Income (2011)	Median Household Income (2007 11)	Poverty Rate (2007 11)	Unemployment Rate (2011)
Bethel Census Area	$32,108	$52,063	19.8%	14.7%
Wade Hampton Census Area	$21,992	$39,583	30.0%	20.4%
Nome Census Area	$35,160	$52,435	25.0%	12.3%
Northwest Arctic Borough	$34,720	$59,893	19.6%	14.7%
North Slope Borough	$48,447	$76,667	10.6%	5.4%
Study Area[2]	$35,672	$57,737	21.0%	12.8%
State of Alaska	$45,665	$69,014	9.5%	7.6%
U.S.	$41,560	$52,762	14.3%	8.9%

[1] The data presented here is the most recent data available from reliable sources that is consistent across the various geographic levels analyzed.

[2] Weighted average based on population in each census area/borough.

Sources:

U.S. Census Bureau, State and County Quickfacts, http://quickfacts.census.gov, accessed January 28, 2013.

U.S. Bureau of Economic Analysis, CA04 Personal Income and Employment Summary.

Alaska Department of Labor and Workforce Development: Research and Analysis, http://live.laborstats.alaska.gov/labforce/, accessed January 28, 2013.

Table 5-6 Historic Median Household Incomes (2011 dollars)

Area	Median Household Income (1989)	Median Household Income (1999)	Median Household Income (2007 11)	Median Income Growth (1989 to 2011)
Bethel Census Area	$25,402	$35,701	$52,063	105.0%
Wade Hampton Census Area	$20,586	$30,184	$39,583	92.3%
Nome Census Area	$30,144	$41,250	$52,435	74.0%
Northwest Arctic Borough	$33,313	$45,976	$59,893	79.8%
North Slope Borough	$50,473	$63,173	$76,667	51.9%
Study Area[1]	$34,167	$45,715	$57,737	73.5%
State of Alaska	$41,408	$51,571	$69,014	66.7%
U.S.	$30,056	$41,994	$52,762	75.5%

[1] Weighted average based on population in each census area/borough.

Sources:

U.S. Census Bureau, Table C1, Median Household Income by County: 1969, 1979, 1989, http://www.census.gov/hhes/www/income/data/historical/county/county1.html, accessed January 28, 2013.

U.S. Census Bureau, Table DP-3, Profile of Selected Economic Characteristics: 2000 U.S. Census Bureau American FactFinder, DP03, Selected Economic Characteristics, 2007-2011 American Community Survey 5-Year Estimates.

U.S. Census Bureau, State and County Quickfacts, http://quickfacts.census.gov, accessed February 20, 2013.

5.2.5 Major Economic Sectors

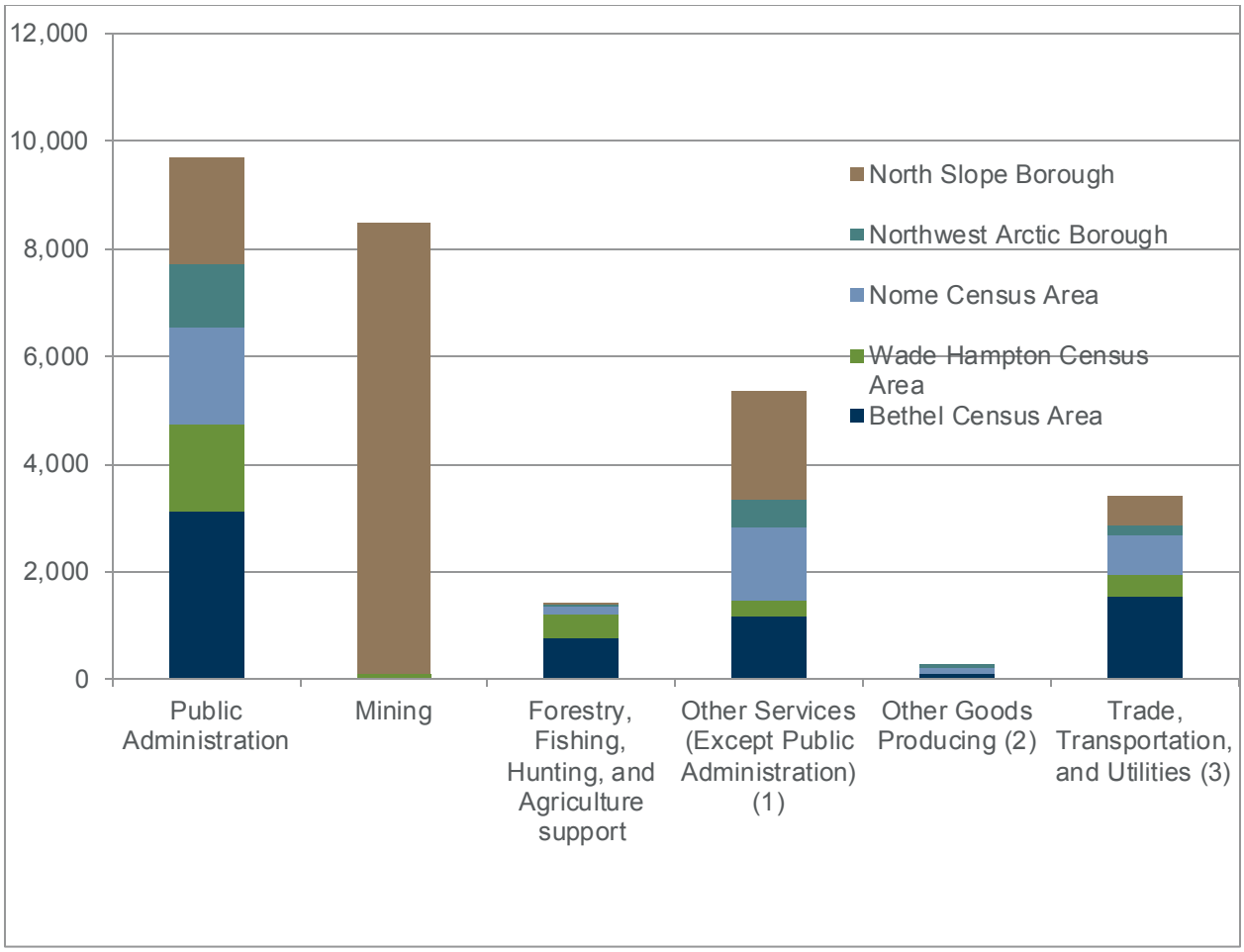
Alaska's Northern Region, including the North Slope and Northwest Arctic boroughs and the Nome Census Area, is characterized by two types of economies: one is village-based with most workers employed by local government or service industries, augmented with subsistence production, while the other is based on mineral and oil and gas resource extraction (predominantly at Prudhoe Bay and the Red Dog Mine near Kotzebue).[72] Moving farther south in the Study Area, the economies in the Bethel and Wade Hampton census areas are also dependent upon natural resources, primarily commercial fishing and subsistence activities.[73] The town of Bethel within the Bethel Census Area also includes a significant service industry base as the town is a service center for the surrounding region.

Throughout the Study Area, the government sector is a key employer, supporting 30 percent of total employment. In all areas of the Study Area except the North Slope Borough (where 61 percent of employment is in mining, primarily oil and gas), local and Federal government provide more than half of all resident employment. Tribal government also provides significant employment opportunities for the local population.

Figure 5-2 presents a broad overview of the employment by major sector within the Study Area. As shown in the figure, mining and government (public administration) are the largest employers, with the service sector and trade, transportation and utilities also provide a significant share of employment. Nearly all mining employment (which includes oil and gas activities) is in the North Slope Borough, with some also located in the Wade Hampton Census Area.

[72] Alaska Department of Labor and Workforce Development. 2013. *2011 Residency of Alaska Workers.* Website: http://labor.alaska.gov/research/reshire/nonres.pdf.

[73] Alaska Department of Labor and Workforce Development. 2013. *Alaska Local and Regional Information*. Website: http://live.laborstats.alaska.gov/alari/.



1) Includes NAICS Code 81 (Other services, except public administration); 51 (Information); 52 (Finance and insurance); 53 (Real estate and rental and leasing); 54 (Professional, scientific, and technical services); 55 (Management of companies and enterprises); 56 (Administrative and support and w aste management and remediation services); 61 (Education services); 62 (Health care and social assistance); 71 (Arts, entertainment, and recreation); 72 (Accommodation and food services).
2) Includes NAICS Codes 23 (Construction); 31-33 (Manufacturing).
3) Includes NAICS Codes 42 (Wholesale trade); 44-45 (Retail trade); 48-49 (Transportation and Warehousing); 22 (Utilities).

Source: Bureau of Economic Analysis, 2010, Table CA25N Total Full-Time and Part-Time Employment by NAICS Industry.

Figure 5-2 Employment by Sector and by Borough/Census Area

Tables 5-7 through 5-11 provide more detail on the number of employees, by sector, as well as information on employer establishments, annual payroll, number of non-employer firms, and non-employer receipts for the various industry sectors within the five boroughs. Industry sectors are defined by the North American Industry Classification System (NAICS). Unlike employer establishments, non-employer firms have no paid employees; however, non-employer receipts contribute substantially to a number of sectors.

Table 5-7 Full-Time and Part-Time Employment for Bethel Census Area and Non-Employer Statistics

NAICS Code[a]	Industry Code Description	Number of Employees[b]	Employer Establishments[c]	Compensation of Employees Received[d]	Non Employer Firms[e]	Non Employer Receipts ($1,000)[f]
	Government and government enterprises	3,135	*Not Reported*	161,876	*Not Reported*	*Not Reported*
44----	Retail trade	779	57	15,713	34	2,664
11----	Forestry, fishing, hunting, and agriculture support	772	0	0	676	6,425
81----	Other services (except public administration)	622	17	21,335	65	1,475
48----	Transportation & warehousing	600	26	21,776	110	3,595
56----	Admin, support, waste mgt, remediation services	157	4	10,901	30	351
51----	Information	110	6	5,803	*Unavailable*	*Unavailable*
22----	Utilities	107	12	4,218	*Unavailable*	*Unavailable*
71----	Arts, entertainment & recreation	89	7	975	13	321
54----	Professional, scientific & technical services	88	8	1,828	60	1,936
72----	Accommodation & food services	88	18	1,249	20	1,646
23----	Construction	85	14	1,764	38	2,332
42----	Wholesale trade	48	4	2,106	4	178
21----	Mining	*Unavailable*	0	*Unavailable*	6	617
31----	Manufacturing	*Unavailable*	1	*Unavailable*	4	33
52----	Finance & insurance	*Unavailable*	6	*Unavailable*	*Unavailable*	*Unavailable*
53----	Real estate & rental & leasing	*Unavailable*	8	*Unavailable*	31	879
61----	Educational services	*Unavailable*	7	*Unavailable*	32	213
62----	Health care and social assistance	*Unavailable*	11	*Unavailable*	36	800
55----	Management of companies & enterprises	0	1	0	0	0
------	Total	8,784	207	350,090	1,166	23,556

Notes:

[a] The U.S., Canada, and Mexico developed North American Industry Classification System (NAICS) is the new industry classification system, which replaces the U.S. Standard Industrial Classification (SIC) system to provide comparable statistics across the three countries.

[b] "Number of employees" are number of jobs, full-time plus part-time, by place of work. Full-time and part-time jobs are counted at equal weight. Employees, sole proprietors, and active partners are included, but unpaid family workers and volunteers are not included.

[c] "Employer establishments" consist of full and part-time employees, including salaried officers and executives of corporations, who were on the payroll in the pay period including March 12. Included are employees on sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

[d] "Compensation of employees, received" is the sum of Wage and Salary Disbursements and Supplements to Wages and Salaries.

[e] A "non-employer firm" is defined as one that has no paid employees, has annual business receipts of $1,000 or more ($1 or more in the construction industries), and is subject to Federal income taxes. Most non-employers are self-employed individuals operating very small unincorporated businesses, which may or may not be the owner's principal source of income.

[f] "Receipts" (net of taxes) are defined as the revenue for goods produced, distributed, or services provided, including revenue earned from premiums, commissions and fees, rents, interest, dividends, and royalties. Receipts exclude all revenue collected for local, state, and Federal taxes.

Sources:

U.S. Census Bureau, 2010, Non-Employer Statistics.

U.S. Census Bureau, 2010 County Business Patterns.

Bureau of Economic Analysis, 2010, Table CA25N Total Full-Time and Part-Time Employment by NAICS Industry.

Bureau of Economic Analysis, 2010, Table CA06N Compensation of Employees by NAICS Industry.

Table 5-8 2010 County Business Patterns for North Slope Borough and Non-Employer Statistics

NAICS Code[a]	Industry Code Description	Number of Employees[b]	Employer Establishments[c]	Compensation of Employees Received[d]	Non Employer Firms[e]	Non Employer Receipts ($1,000)[f]
21----	Mining	8,383	2	1,011,704	*Not Reported*	*Not Reported*
	Government and government enterprises	2,006	*Not Reported*	144,459	*Not Reported*	*Not Reported*
56----	Admin, support, waste mgt, remediation services	1,121	4	82,123	18	370
81----	Other services (except public administration)	369	8	25,638	26	644
52----	Finance & insurance	342	2	53,324	*Unavailable*	*Unavailable*
44----	Retail trade	284	20	11,175	19	619
48----	Transportation & warehousing	241	13	25,749	38	1,425
53----	Real estate & rental & leasing	123	4	1,377	7	233
51----	Information	53	11	4,281	*Unavailable*	*Unavailable*
11----	Forestry, fishing, hunting, and agriculture support	35	*Not Reported*	0	4	47
54----	Professional, scientific & technical services	*Unavailable*	10	*Unavailable*	73	1,026
55----	Management of companies & enterprises	*Unavailable*	4	*Unavailable*	*Not Reported*	*Not Reported*
22----	Utilities	*Unavailable*	1	*Unavailable*	*Unavailable*	*Unavailable*
23----	Construction	*Unavailable*	6	*Unavailable*	10	240
31----	Manufacturing	*Unavailable*	2	*Unavailable*	*Unavailable*	*Unavailable*
42----	Wholesale trade	*Unavailable*	9	*Unavailable*	*Not Reported*	*Not Reported*
61----	Educational services	*Unavailable*	1	*Unavailable*	*Unavailable*	*Unavailable*
62----	Health care and social assistance	*Unavailable*	3	*Unavailable*	*Unavailable*	*Unavailable*
71----	Arts, entertainment & recreation	*Unavailable*	4	*Unavailable*	26	294
72----	Accommodation & food services	*Unavailable*	29	*Unavailable*	10	329
------	Total	14,355	133	1,442,921	253	5,786

Notes:

[a] The U.S., Canada, and Mexico developed North American Industry Classification System (NAICS) is the new industry classification system, which replaces the U.S. Standard Industrial Classification (SIC) system to provide comparable statistics across the three countries.

[b] "Number of employees" are number of jobs, full-time plus part-time, by place of work. Full-time and part-time jobs are counted at equal weight. Employees, sole proprietors, and active partners are included, but unpaid family workers and volunteers are not included.

[c] "Employer establishments" consist of full and part-time employees, including salaried officers and executives of corporations, who were on the payroll in the pay period including March 12. Included are employees on sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

[d] "Compensation of employees, received" is the sum of Wage and Salary Disbursements and Supplements to Wages and Salaries.

[e] A "non-employer firm" is defined as one that has no paid employees, has annual business receipts of $1,000 or more ($1 or more in the construction industries), and is subject to Federal income taxes. Most non-employers are self-employed individuals operating very small unincorporated businesses, which may or may not be the owner's principal source of income.

[f] "Receipts" (net of taxes) are defined as the revenue for goods produced, distributed, or services provided, including revenue earned from premiums, commissions and fees, rents, interest, dividends, and royalties. Receipts exclude all revenue collected for local, state, and Federal taxes.

Sources:

U.S. Census Bureau, 2010, Non-Employer Statistics.

U.S. Census Bureau, 2010 County Business Patterns.

Bureau of Economic Analysis, 2010, Table CA25N Total Full-Time and Part-Time Employment by NAICS Industry.

Bureau of Economic Analysis, 2010, Table CA06N Compensation of Employees by NAICS Industry.

Table 5-9 2010 County Business Patterns for Northwest Arctic Borough and Non-Employer Statistics

NAICS Code[a]	Industry Code Description	Number of Employees[b]	Employer Establishments[c]	Compensation of Employees Received[d]	Non Employer Firms[e]	Non Employer Receipts ($1,000)[f]
	Government and government enterprises	1,182	*Not Reported*	61,752	*Not Reported*	*Not Reported*
48----	Transportation & w arehousing	186	11	14,470	8	576
71----	Arts, entertainment & recreation	179	2	695	*Unavailable*	*Unavailable*
72----	Accommodation & food services	148	5	7,115	*Withheld*	*Withheld*
81----	Other services (except public administration)	91	6	2,405	24	419
23----	Construction	78	3	6,242	17	72
51----	Information	72	5	4,557	*Not Reported*	*Not Reported*
11----	Forestry, fishing, hunting, and agriculture support	55	*Not Reported*	0	46	686
61----	Educational services	26	1	131	*Unavailable*	*Unavailable*
21----	Mining	*Unavailable*	1	*Unavailable*	*Unavailable*	*Unavailable*
22----	Utilities	*Unavailable*	2	*Unavailable*	*Unavailable*	*Unavailable*
31----	Manufacturing	*Unavailable*	*Not Reported*	*Unavailable*	*Unavailable*	*Unavailable*
44----	Retail trade	*Unavailable*	13	*Unavailable*	24	2,371
52----	Finance & insurance	*Unavailable*	1	*Unavailable*	*Unavailable*	*Unavailable*
53----	Real estate & rental & leasing	*Unavailable*	3	*Unavailable*	16	1,659
54----	Professional, scientific & technical services	*Unavailable*	2	*Unavailable*	33	1,025
56----	Admin, support, w aste mgt, remediation services	*Unavailable*	4	*Unavailable*	13	209
62----	Health care and social assistance	*Unavailable*	4	*Unavailable*	20	706
42----	Wholesale trade	*Withheld*	*Not Reported*	0	*Unavailable*	*Unavailable*
55----	Management of companies & enterprises	0	1	0	*Not Reported*	*Not Reported*
------	Total	3,599	64	206,971	237	8,331

Notes:

[a] The U.S., Canada, and Mexico developed North American Industry Classification System (NAICS) is the new industry classification system, w hich replaces the U.S. Standard Industrial Classification (SIC) system to provide comparable statistics across the three countries.

[b] "Number of employees" are number of jobs, full-time plus part-time, by place of w ork. Full-time and part-time jobs are counted at equal w eight. Employees, sole proprietors, and active partners are included, but unpaid family w orkers and volunteers are not included.

[c] "Employer establishments" consist of full and part-time employees, including salaried officers and executives of corporations, who w ere on the payroll in the pay period including March 12. Included are employees on sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

[d] "Compensation of employees, received" is the sum of Wage and Salary Disbursements and Supplements to Wages and Salaries.

[e] A "non-employer firm" is defined as one that has no paid employees, has annual business receipts of $1,000 or more ($1 or more in the construction industries), and is subject to Federal income taxes. Most non-employers are self-employed individuals operating very small unincorporated businesses, which may or may not be the owner's principal source of income.

[f] "Receipts" (net of taxes) are defined as the revenue for goods produced, distributed, or services provided, including revenue earned from premiums, commissions and fees, rents, interest, dividends, and royalties. Receipts exclude all revenue collected for local, state, and Federal taxes.

Sources:

U.S. Census Bureau, 2010, Non-Employer Statistics.

U.S. Census Bureau, 2010 County Business Patterns.

Bureau of Economic Analysis, 2010, Table CA25N Total Full-Time and Part-Time Employment by NAICS Industry.

Bureau of Economic Analysis, 2010, Table CA06N Compensation of Employees by NAICS Industry.

Table 5-10 2010 County Business Patterns for Nome Census Area and Non-Employer Statistics

NAICS Code[a]	Industry Code Description	Number of Employees[b]	Employer Establishments[c]	Compensation of Employees Received[d]	Non Employer Firms[e]	Non Employer Receipts ($1,000)[f]
	Government and government enterprises	1,788	*Not Reported*	103,076	*Not Reported*	*Not Reported*
62----	Health care and social assistance	779	22	48,454	39	1,068
48----	Transportation & w arehousing	358	12	15,724	24	690
44----	Retail trade	331	32	9,696	23	961
72----	Accommodation & food services	223	16	4,189	21	792
52----	Finance & insurance	189	5	6,124	*Unavailable*	*Unavailable*
81----	Other services (except public administration)	170	16	3,991	41	911
23----	Construction	131	11	7,795	28	886
11----	Forestry, fishing, hunting, and agriculture support	130	0	0	116	2,626
53----	Real estate & rental & leasing	121	6	5,097	28	3,062
71----	Arts, entertainment & recreation	121	7	820	21	192
56----	Admin, support, w aste mgt, remediation services	64	8	1,443	24	197
22----	Utilities	39	2	1,123	*Unavailable*	*Unavailable*
51----	Information	30	3	1,057	*Unavailable*	*Unavailable*
61----	Educational services	26	2	0	16	134
42----	Wholesale trade	10	4	0	*Unavailable*	*Unavailable*
21----	Mining	*Unavailable*	2	*Unavailable*	18	2,102
31----	Manufacturing	*Unavailable*	3	*Unavailable*	*Unavailable*	*Unavailable*
54----	Professional, scientific & technical services	*Unavailable*	6	*Unavailable*	51	798
55----	Management of companies & enterprises	*Unavailable*	0	*Unavailable*	0	0
------	Total	4,758	157	217,155	462	14,786

Notes:

[a] The U.S., Canada, and Mexico developed North American Industry Classification System (NAICS) is the new industry classification system, w hich replaces the U.S. Standard Industrial Classification (SIC) system to provide comparable statistics across the three countries.

[b] "Number of employees" are number of jobs, full-time plus part-time, by place of w ork. Full-time and part-time jobs are counted at equal w eight. Employees, sole proprietors, and active partners are included, but unpaid family w orkers and volunteers are not included.

[c] "Employer establishments" consist of full and part-time employees, including salaried officers and executives of corporations, who w ere on the payroll in the pay period including March 12. Included are employees on sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

[d] "Compensation of employees, received" is the sum of Wage and Salary Disbursements and Supplements to Wages and Salaries.

[e] A "non-employer firm" is defined as one that has no paid employees, has annual business receipts of $1,000 or more ($1 or more in the construction industries), and is subject to Federal income taxes. Most non-employers are self-employed individuals operating very small unincorporated businesses, which may or may not be the owner's principal source of income.

[f] "Receipts" (net of taxes) are defined as the revenue for goods produced, distributed, or services provided, including revenue earned from premiums, commissions and fees, rents, interest, dividends, and royalties. Receipts exclude all revenue collected for local, state, and Federal taxes.

Sources:

U.S. Census Bureau, 2010, Non-Employer Statistics.

U.S. Census Bureau, 2010 County Business Patterns.

Bureau of Economic Analysis, 2010, Table CA25N Total Full-Time and Part-Time Employment by NAICS Industry.

Bureau of Economic Analysis, 2010, Table CA06N Compensation of Employees by NAICS Industry.

Table 5-11 2012 County Business Patterns for Wade Hampton Census Area and Non-Employer Statistics

NAICS Code[a]	Industry Code Description	Number of Employees[b]	Employer Establishments[c]	Compensation of Employees Received[d]	Non Employer Firms[e]	Non Employer Receipts ($1,000)[f]
	Government and government enterprises	1,606	*Not Reported*	59,116	*Not Reported*	*Not Reported*
11----	Forestry, fishing, hunting, and agriculture support	450	*Not Reported*	0	416	2,517
44----	Retail trade	319	13	6,105	10	369
81----	Other services (except public administration)	167	6	3,536	29	292
21----	Mining	110	1	0	*Unavailable*	*Unavailable*
48----	Transportation & w arehousing	100	11	2,537	10	229
71----	Arts, entertainment & recreation	48	2	183	*Unavailable*	*Unavailable*
56----	Admin, support, w aste mgt, remediation services	43	4	0	15	175
72----	Accommodation & food services	25	5	0	*Unavailable*	*Unavailable*
61----	Educational services	18	1	0	*Unavailable*	*Unavailable*
22----	Utilities	*Unavailable*	2	*Unavailable*	*Unavailable*	*Unavailable*
23----	Construction	*Unavailable*	3	*Unavailable*	10	118
31----	Manufacturing	*Unavailable*	*Not Reported*	*Unavailable*	*Unavailable*	*Unavailable*
42----	Wholesale trade	*Unavailable*	*Not Reported*	*Unavailable*	*Not Reported*	*Not Reported*
52----	Finance & insurance	*Unavailable*	1	*Unavailable*	*Unavailable*	*Unavailable*
53----	Real estate & rental & leasing	*Unavailable*	3	*Unavailable*	10	148
54----	Professional, scientific & technical services	*Unavailable*	2	*Unavailable*	26	146
62----	Health care and social assistance	*Unavailable*	4	*Unavailable*	13	57
51----	Information	*Withheld*	5	0	*Unavailable*	*Unavailable*
55----	Management of companies & enterprises	0	1	0	*Not Reported*	*Not Reported*
------	Total	3,361	64	84,727	558	4,157

Notes:

[a] The U.S., Canada, and Mexico developed North American Industry Classification System (NAICS) is the new industry classification system, w hich replaces the U.S. Standard Industrial Classification (SIC) system to provide comparable statistics across the three countries.

[b] "Number of employees" are number of jobs, full-time plus part-time, by place of w ork. Full-time and part-time jobs are counted at equal w eight. Employees, sole proprietors, and active partners are included, but unpaid family w orkers and volunteers are not included.

[c] "Employer establishments" consist of full and part-time employees, including salaried officers and executives of corporations, who w ere on the payroll in the pay period including March 12. Included are employees on sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

[d] "Compensation of employees, received" is the sum of Wage and Salary Disbursements and Supplements to Wages and Salaries.

[e] A "non-employer firm" is defined as one that has no paid employees, has annual business receipts of $1,000 or more ($1 or more in the construction industries), and is subject to Federal income taxes. Most non-employers are self-employed individuals operating very small unincorporated businesses, which may or may not be the owner's principal source of income.

[f] "Receipts" (net of taxes) are defined as the revenue for goods produced, distributed, or services provided, including revenue earned from premiums, commissions and fees, rents, interest, dividends, and royalties. Receipts exclude all revenue collected for local, state, and Federal taxes.

Sources:

U.S. Census Bureau, 2010, Non-Employer Statistics.
U.S. Census Bureau, 2010 County Business Patterns.
Bureau of Economic Analysis, 2010, Table CA25N Total Full-Time and Part-Time Employment by NAICS Industry.
Bureau of Economic Analysis, 2010, Table CA06N Compensation of Employees by NAICS Industry.

5.3 Regulatory Baseline

This section provides relevant information about the baseline regulatory elements that may provide conservation protections for the Arctic ringed seals. Where proposed activities directly affect CH areas, these existing regulations may provide a level of protection to the species, even in the absence of Section 7 of the ESA.

5.3.1 Federal

This section summarizes Federal regulatory elements.

5.3.1.1 Marine Mammal Protection Act of 1972

Arctic ringed seals benefit from protections afforded by the MMPA. The MMPA prohibits the taking and importation of marine mammals and marine mammal products in U.S. waters, subject to a number of exceptions.[74] Some of these exceptions include take for scientific purposes, public display, subsistence use by Alaska Natives, and unintentional incidental take coincident with conducting lawful activities. Take is defined in the MMPA to include the "harassment" of marine mammals. "Harassment" includes any act of pursuit, torment, or annoyance which "has the potential to injure a marine mammal or marine mammal stock in the wild" or "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."

U.S. citizens who engage in a specified activity other than commercial fishing (which is specifically and separately addressed under the MMPA) within a specified geographical region may petition the Secretary to authorize the incidental, but not intentional, taking of small numbers of marine mammals within that region for a period of not more than five consecutive years. If the Secretary makes certain MMPA-required findings, regulations (i.e., incidental take regulations or ITRs) are prescribed that specify permissible levels of take, means of effecting the least adverse impact on the species and its habitat, and requirements for monitoring and reporting. Similar to promulgation of incidental take regulations, the MMPA also established an expedited process by which U.S. citizens can apply for an authorization to incidentally take small numbers of marine mammals where the take will be limited to harassment (i.e., incidental harassment authorizations or IHAs). These authorizations are limited to one year and, as with incidental regulations, the Secretary must make certain MMPA-required findings for issuance of such authorizations.

Any marine mammal listed as an endangered or threatened species under the ESA automatically has depleted status under the MMPA, which triggers certain MMPA provisions for depleted stocks. In the future, if NMFS expressly concludes that the harvest of Arctic ringed seals by Alaska Natives is materially and negatively affecting the species, NMFS may regulate such harvests pursuant to sections 101(b) and

[74] The Marine Mammal Project Action of 1972 As Amended (amended in 2007).

103(d) of the MMPA. NMFS would have to hold an administrative hearing on the record for such proposed regulations. NMFS concluded that currently, the subsistence harvest of Arctic ringed seals by Alaska Natives appears to be sustainable, and NMFS does not expect that the listing of the Arctic ringed seal under the ESA will lead to any regulation of subsistence harvest of these seals by Alaska Natives.[75]

5.3.1.2 Endangered Species Act

The listing of the Arctic ringed seal under the ESA results in protection under Section 7 of the ESA. Section 7 requires Federal agencies to ensure that actions they fund, authorize, or carry out will not jeopardize the continued existence of any endangered or threatened species, or destroy or adversely modify designated CH.[76] "Action," in this case, is defined broadly to include Federal grants, permitting, licensing, or other regulatory actions. In general, if a listed species may be present in an action area, the Federal action agency must determine whether the proposed action may affect listed species or CH. If the action agency's assessment shows, and NMFS agrees, that the proposed action is not likely to adversely affect listed species or CH, then NMFS provides concurrence in writing and the consultation (informal to this point) is concluded.

If the Federal action agency determines that a proposed action may affect listed species or destroy or adversely modify CH, then it must request initiation of formal consultation. During the formal consultation process, the action agency supplies NMFS with information that includes descriptions of the proposed action, action area, listed species and CH that may be affected, and how the species and CH may be affected by that action. Once complete information is received by NMFS, NMFS has up to 135 days to complete consultation and prepare a biological opinion that contains the analysis of whether or not the proposed action would be likely to jeopardize the continued existence of the species or adversely modify or destroy designated CH. If a jeopardy or adverse modification determination is made, the biological opinion must identify RPAs, if any, that would avoid the likelihood of jeopardizing the listed species or destruction or adverse modification of CH and that are economically and technologically feasible. As noted in **Section 3.1.3**, the action agency may choose to 1) implement an RPA, 2) modify the proposed action and consult with NMFS again, 3) decide not to authorize, fund, or 4) otherwise proceed with the action, or apply for an exception, a process rarely undertaken.

A biological opinion includes an incidental take statement (ITS) to that identifies the level of take that is anticipated from implementation of the proposed action and exempts the action agency from the ESA section 9 prohibition on take. Incidental take is take that is incidental to, and not the purpose of, an otherwise lawful activity. The ITS also specifies non-discretionary reasonable and prudent measures, considered necessary or appropriate to minimize the impact of the anticipated incidental take to the species.

ESA-listed species that occur within the proposed Arctic ringed seal CH include polar bear, spectacled eider, Steller's eider, bowhead whale, fin whale, humpback whale, North Pacific right whale and Steller sea lion. Designated CH exists within the proposed ringed seal CH for spectacled eider (Units 3 and 4, Norton Sound and Ledyard Bay, respectively). **Figure 5-3** depicts the CH boundaries for this species compared to the proposed Arctic ringed seal CH boundary.

Measures that protect these species or designated CH may also provide some protection to Arctic ringed seals where the species co-occur. Similarly, designating CH for Arctic ringed seals may benefit other sensitive species by protecting habitat they share.

In areas where there is existing CH, activities with potential adverse impacts on these habitats would already result in consultations with NMFS or the USFWS, depending on species management agency.

[75] National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2013. *Ice Seals: Frequently Asked Questions*. Website: http://alaskafisheries.noaa.gov/protectedresources/seals/ice.htm

[76] 16 USC 1536(a)(2)

As such, in these areas, the incremental costs of consultations required due to the Arctic ringed seal proposed CHD may be reduced due to cost efficiencies in addressing potential impacts to multiple species simultaneously.

Figure 5-3

Overlap of Proposed Artic Ringed Seal Critical Habitat with Critical Habitat Designations for Other Species

Legend

- Proposed Ringed Seal Critical Habitat
- Spectacled Eider Critical Habitat
- Steller's Eider Critical Habitat
- Borough/Census Area

0 50 100 200
Miles

N

Data Source: National Marine Fisheries Service

Cardno ENTRIX

5.3.1.3 Public Law 110-243

Public Law 110-243 is a joint resolution that directs the U.S. to "initiate international discussions, and take necessary steps with other Arctic nations to negotiate an agreement or agreements for managing migratory, transboundary, and straddling fish stocks in the Arctic Ocean and establishing a new international fisheries management organization (or organizations) for the region."[77]

5.3.1.4 Magnuson-Stevens Fishery Conservation and Management Act: Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (as amended through 1996) (MSA) mandates that fishery management plans (FMPs) be developed by the Regional Fishery Management Councils to prevent overfishing and rebuild overfished fisheries. The MSA includes provisions requiring the Councils to describe and identify essential fish habitat (EFH) for the managed species, minimize to the extent practicable adverse effects on EFH caused by fishing, and identify other actions to encourage the conservation and enhancement of EFH. EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity (16 USC § 1802(10)). In January 2007, the MSA was amended to mandate the use of annual catch limits in Federally-managed fisheries and accountability measures to end overfishing, provide for widespread market-based fishery management through limited access programs, and to call for increased international cooperation.

The MSA requires Federal agencies to consult with NMFS regarding any action they authorize, fund, or undertake that may adversely affect EFH, and NMFS must provide conservation recommendations to Federal and State agencies regarding any action that would adversely affect EFH. After receiving a conservation recommendation from NMFS, the Federal agency must respond in writing, describing measures the agency proposes to mitigate or offset the adverse impacts on EFH, or explain its reasons for proposing to proceed in a manner inconsistent with NMFS' recommendations.

The Arctic ringed seal prey species EF identifies Arctic cod, saffron cod, amphipods, and shrimps as primary prey. EFH has been designated within a substantial portion of the proposed CHD for late juvenile and adult Arctic cod and saffron cod. EFH has also been designated in a number of areas for certain life stages of other Arctic ringed seal prey species, such as walleye pollock and yellowfin sole.

The MSA may provide indirect conservation benefits to Arctic ringed seals by imposition of measures to prevent overfishing of Arctic ringed seal prey species and by improving conditions for these prey species.

5.3.1.5 Arctic Fishery Management Plan

Changing ecological conditions and warming trends in the Arctic could lead to development of a commercial fishery in the U.S. Arctic. Recognizing this, in 2009 under the MSA the North Pacific Fishery Management Council (NPFMC) approved a new FMP for Fish Resources of the Arctic Management Area (Arctic FMP) to be implemented by NMFS. The Arctic FMP covers all marine waters in the U.S. EEZ of the Chukchi and Beaufort seas from three nautical miles offshore of the coast of Alaska to 200 nautical miles offshore, north of the Bering Strait, west to the 1990 U.S/Russia maritime boundary line, and east to the U.S./Canada maritime boundary. Under the Arctic FMP, no federally managed commercial fisheries will be authorized in the Arctic Management Area until sufficient information is available to support the sustainable management of a commercial fishery. The Arctic FMP does not regulate subsistence fishing, recreational fishing, or State of Alaska-managed fisheries in the Arctic, nor does it regulate the harvest of marine mammals and birds.[78]

[77] 122 STAT. 1569

[78] North Pacific Fishery Management Council. Council Guide: Part IV: *Fishery Management Plans*. Accessed at: http://www.pcouncil.org/council-operations/council-guide/part-iv-fishery-management-plans/. Accessed online February 7, 2013.

Figure 5-4

Essential Fish Habitat Overlapping Northern Areas of Proposed Arctic Ringed Seal Critical Habitat

Legend

- Proposed Ringed Seal Critical Habitat
- County Boundary (Boroughs)
- Arctic Cod
- Opilio Arctic Crab
- Saffron Cod

0 50 100
Miles

N

Data Sources: National Marine Fisheries Service; NOAA

Cardno ENTRIX

Document Path: T:\shared\gis\nt\IceSeals\MXDS\RingedSeals_Final\Fig5_4_RingedSeals_EFH1.mxd

Figure 5-5

Essential Fish Habitat Overlapping Southern Areas of Proposed Arctic Ringed Seal Critical Habitat

Legend

- Proposed Ringed Seal Critical Habitat
- Essential Fish Habitat

0 50 100
Miles

N

Data Sources: National Marine Fisheries Service; NOAA

Cardno ENTRIX

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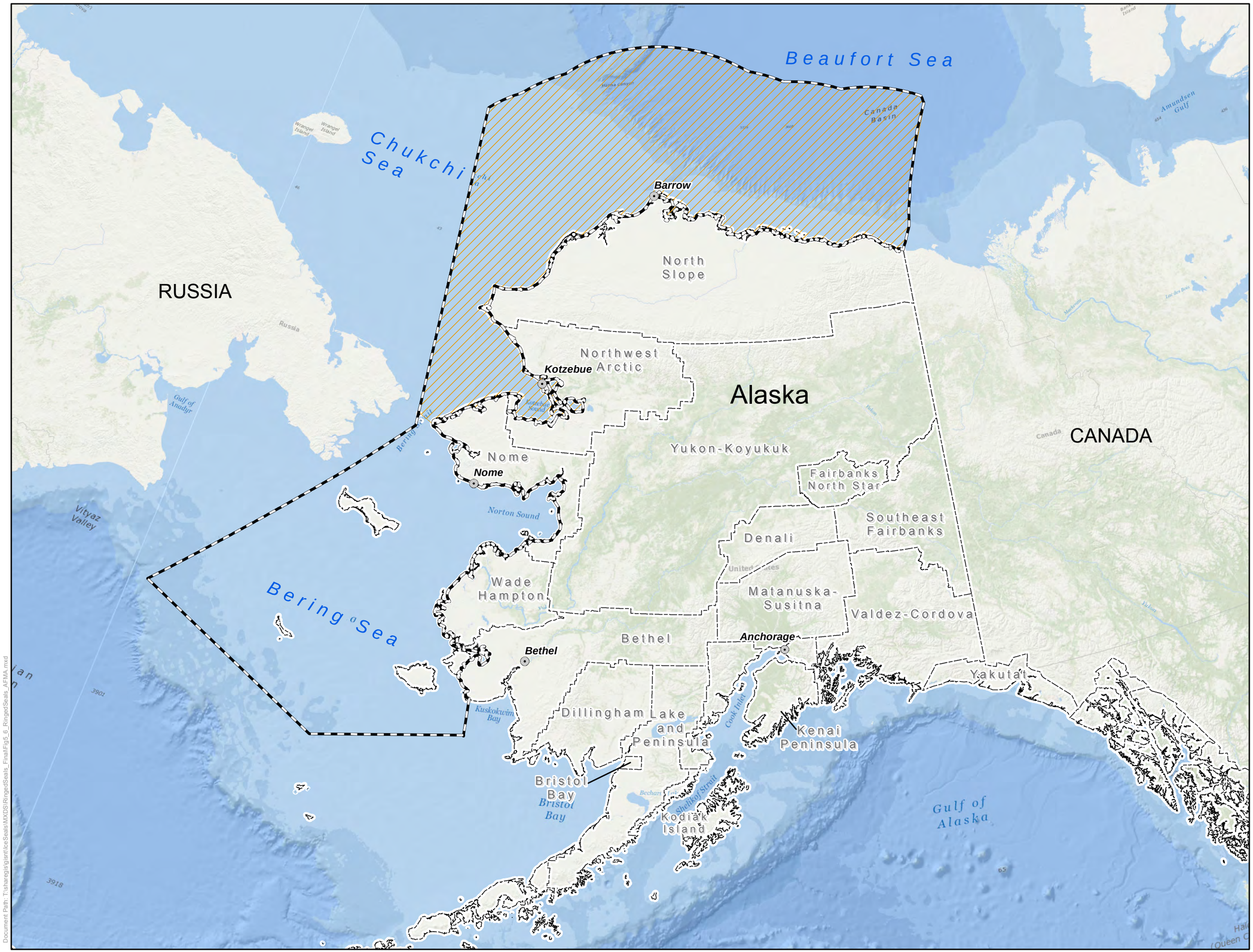
Diomede
Wales
Deering
Buckland
Brevig Mission
Teller
Nome
White Mountain
Golovin
Koyuk
Koyukuk
Nulato
Galena
Elim
Shaktoolik
Kaltag
Gambel
Savoonga
St. Lawrence Island
Unalakleet
Stebbins
Saint Michael
Alaska
Kotlik
Emmonak
Alakanuk
Grayling
Anvik
Shageluk
Mountain V˙ lage
Scammon Bay
Saint Mary's
Holy Cross
Hooper Bay
P˙lot Station
Russian Mission
Marshal
Lower Kalskag
Aniak
Chuathbaluk
Kalskag
St. Matthew Island
Bering Sea
Toksook Bay
Nunapitchuk
Kwethluk
Akiak
Mekoryuk
Nightmute
Bethel
kiak
Nunivak Island
Chefornak
Eek
Quinhagak
Goodnews Bay
New Stuyahok
Aleknagik
Ekwok
Platinum
Togiak
D˙ ingham
Manokotak
Clarks Point
Egegik
Saint Paul
Saint George
P˙lot Point

Figure 5-6

Arctic Fishery Management Area



Legend

- Major City
- Proposed Ringed Seal Critical Habitat
- Arctic Management Area
- Borough/Census Area

0 50 100 200
Miles

N

Data Sources: National Marine Fisheries Service, NOAA

Cardno ENTRIX

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5.3.1.7 Rivers and Harbors Act

The Rivers and Harbors Act (RHA; 33 USC §§ 401 et seq.) authorizes the USACE to issue permits for dams or dikes in intrastate waters of the U.S. (Section 9) and construction or other work, such as construction of docks/piers and aquaculture structures and work such as dredging or disposal of dredged materials, in or affecting navigable waters (Section 10). In issuing these permits, USACE conducts a "public interest balancing," which can include evaluation of beneficial and detrimental effects of a project on fish and wildlife values. As a general matter, adverse impacts to Arctic ringed seals are considered to be detrimental to the public interest, and the USACE findings for Section 10 permits must document how these impacts would be avoided. Through this evaluation, USACE requires applicants to avoid and minimize impacts of a project by altering its design or by including mitigation measures.

The RHA also authorizes the U.S. Coast Guard (USCG) to protect U.S. navigable waters, which are considered those waters that, at some time in the past, present, or future, are used to transport interstate or foreign commerce. Protection of navigable waters also includes regulating bridge-related activities. In general, a bridge cannot be constructed across any navigable water(s) until the USCG has approved the location and construction plans. Under 14 USC § 81, the USCG is also charged with establishing, maintaining, and operating aids to navigation to serve the needs of U.S. armed forces and maritime commerce, and when those aids are electronic, air commerce as well, when requested by the Federal Aviation Administration.

5.3.1.8 Clean Water Act (CWA)

The purpose of the CWA is to restore the physical, biological, and chemical integrity of the waters of the U.S., using two basic mechanisms: (1) direct regulation of discharges pursuant to permits issued under the National Pollution Discharge Elimination System (NPDES) and Section 404 (discharge of dredge or fill materials); and (2) the Title III water quality program.

Under the NPDES program, the U.S. Environmental Protection Agency (EPA) sets pollutant-specific limits on the point source discharges for major industries and provides permits that apply these limits to individual point sources. EPA has delegated responsibility for the NPDES permitting program to most states, including the State of Alaska. State-issued NPDES permits are treated as non-Federal actions. As such, the issuance of NPDES permits by states is not subject to the consultation requirements of the ESA.

Under the water quality standards program, EPA has issued water quality criteria to establish limits on the ambient concentration of pollutants in surface waters that will still protect the health of the water body. States issue water quality standards that reflect the Federal water quality criteria and submit the standards to EPA for review. State water quality standards are subject to review every three years (triennial review). States apply the standards to NPDES discharge permits to ensure that these discharges do not violate the State water quality standards.

Under Section 401 of the CWA, all applicants for a Federal license or permit to conduct activity that may result in discharge to navigable waters of the U.S. are required to submit a State certification to the licensing or permitting agency. Section 404 of the CWA prescribes a permit program for the discharge of dredged or fill material into navigable waters that requires permit applicants to show that they have "taken steps to avoid wetland impacts, where practicable, minimized potential impacts to wetlands, and provided compensation for any remaining, unavoidable impacts through activities to restore or recreate wetlands."

The CWA will influence activities occurring within the proposed Arctic ringed seal CH, because some of these activities (e.g., road/bridge construction) may require NPDES or Section 404 permits.

5.3.1.9 Clean Water Act; Comprehensive Environmental Response, Compensation, and Liability Act and Oil Pollution Act of 1990

The CWA; Comprehensive Environmental Response, Compensation, and Liability Act (42 USC §§ 9601 et seq.); and the Oil Pollution Act (OPA) of 1990 (33 USC §§ 2701 et seq.) mandate that parties that release hazardous materials or oil into the environment are responsible not only for the cost of cleaning up the release, but also responsible for restoring any injury to natural resources that results from the actual or threatened release, or from response actions. These provisions would be applied to address impacts to Arctic ringed seal CH from release incidents.

5.3.1.10 Water Resources Development Act

The Water Resources Development Act (33 USC §§ 2201 et seq.) authorizes the construction or study of USACE projects, and applies to all features of water resources development and planning, including environmental assessment and mitigation requirements.

5.3.1.11 Act to Prevent Pollution from Ships (APPS) as amended by the Marine Plastic Pollution Research and Control Act (MPPRCA)

The APPS, as amended by the MPPRCA, protects Arctic ringed seal CH by requiring all U.S. ships and all ships in U.S. navigable waters or the EEZ to comply with the International Convention for the Prevention of Pollution from Ships (33 USC §§ 1901 et seq.). Under the regulations implementing APPS, as amended by MPPRCA, the discharge of plastics, including synthetic ropes, fishing nets, plastic bags, and a biodegradable plastic, into the water is prohibited. Discharge of floating dunnage, lining, and packing materials is prohibited in the navigable waters and in areas offshore less than 25 nautical miles from the nearest land. Food waste or paper, trash, glass, metal, bottles, crockery, and similar refuse cannot be discharged in the navigable waters or in waters offshore inside 12 nautical miles from the nearest land. Finally, food waste, paper, rags, glass, and similar refuse cannot be discharged in the navigable waters or in waters offshore inside three nautical miles from the nearest land. There are some exceptions for emergencies. USCG has the primary responsibility for enforcing regulations under the APPS, and the APPS applies to all vessels, including cruise ships, regardless of flag, operating in U.S. navigable waters and the EEZ.

5.3.1.12 The Lacey Act

The Lacey Act, as amended in 1981 (16 USC §§ 3372 et seq.), prohibits the trade of fish, wildlife, or plants taken in violation of any foreign, state, tribal or other U.S. law. For example, it is a violation of the Lacey Act for a retail store in New York to sell Arctic ringed seal parts taken illegally from Alaska.

5.3.2 State Regulations

Alaska Statutes (AS) 16.05.841 and 16.05.871 provide a measure of protection to the Arctic ringed seal prey species EF, by requiring Fish Habitat Permits for activities that may impact the habitat of anadromous fish species, including some species upon which the Arctic ringed seal preys (e.g., rainbow smelt). These statutes are discussed below. For activities that are low impact, practiced by several members of the public in a defined area, and traditional in use (such as boat launches and stream crossings along popular trail systems), General Permits may be issued in place of Fish Habitat Permits.[79] Also, the Alaska Oil and Gas Conservation Act (AOGCA), and associated statutes require practices by the oil and gas industry that provide protection to natural resources such as proposed CH.

[79] Alaska Department of Fish and Game. Division of Habitat. 2013. *Land & Water Use Habitat Permits*. Website accessed online February 11, 2013.

5.3.2.1 Alaska Statute 16.05.841 (Fishway Act)

The Fishway Act requires that private parties or government agencies notify and obtain authorization from ADF&G, Division of Habitat, for activities that cross or occur within a stream that fish use if the activity might impede the efficient passage of resident or anadromous fish.[80]

5.3.2.2 Alaska Statute 16.05.871 (Anadromous Fish Act)

Pursuant to the Anadromous Fish Act, private parties and government agencies must provide prior notification and obtain permit approval from the ADF&G, Division of Habitat, for all activities that occur within or across specified anadromous water bodies. Activities that "use, divert, obstruct, pollute, or change the natural flow or bed" of a specified anadromous water body (quoted portions from AS 16.05.871 (b)) may include construction; bank stabilization; blasting; road crossings; mining; water withdrawals; the use of vehicles or equipment in the waterway; gravel removal; stream realignment or diversion; and the placement, excavation, deposition, or removal of any material.[81] This may provide a measure of protection to some of the species preyed upon by the Arctic ringed seal (e.g., rainbow smelt).

5.3.2.3 Alaska Statute 31.05 (Alaska Oil and Gas Conservation Act)

In 1955, the AOGCA created the Alaska Oil and Gas Conservation Commission (AOGCC). The regulatory authority is listed in Title 20, Chapter 25, of the Alaska Administrative Code (AAC).[82] The purpose of the AOGCC is to "protect the public interest in exploration and development of Alaska's valuable oil, gas, and geothermal resources".[83] Examples of the AOGCC stipulations are the requirements that an application for a Permit to Drill be submitted and approval obtained from the AOGCC prior to drilling, re-drilling, or re-entering a well[84]; and that a complete proposed well casing and cementing program be submitted with the Permit to Drill application that is designed, among other things, to prevent contamination of freshwater.[85]

The AOGCC's authority extends to all oil and gas operations within the state, including operations that occur on federal and privately owned lands.[86] The commission may take enforcement action if it is deemed that an individual violated or failed to comply with a provision of AS 31.05, chapter 25, or a commission order, permit, or other approval.[87] The potential enforcement actions may include one or more of the following as applicable: corrective action or remedial work, revocation or suspension of a permit or other approval, payment under the bond required by 20 AAC 25.025, or imposition of penalties under AS 31.05.150.[88]

5.4 Current and Projected Economic and Social Activity

This section discusses the economic and social activities within and in the vicinity of the Arctic ringed seal proposed CH.

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80 Alaska Department of Fish and Game. Division of Habitat. 2013. *Fish Habitat Regulations*. Website accessed online February 8, 2013.

81 Ibid.

82 Alaska Department of Administration. 2013. Alaska Oil and Gas Conservation Commission. Website: http://doa.alaska.gov/ogc/Regulations/RegIndex.html. Accessed April 22, 2013.

83 Alaska Department of Administration. Alaska Oil and Gas Conservation Commission. Website: http://doa.alaska.gov/ogc/. Accessed April 22, 2013.

84 20 AAC 25.005.

85 20 AAC 25.030.

86 Alaska Department of Administration. Alaska Oil and Gas Conservation Commission. *AOGCC: 50 Years of Service to Alaska*. Website: http://doa.alaska.gov/ogc/WhoWeAre/50th/aogcc50thBooklet.pdf. Accessed April 22, 2013

87 20 AAC 25.535.

88 Ibid.

5.4.1 Oil and Gas Exploration, Development and Production

One of the primary economic activities within and adjacent to the Arctic ringed seal proposed CH is oil and gas exploration, development, and production. The Alaska North Slope (ANS), located on the northern slope of the Brooks Range with coastline running along the Beaufort and Chukchi Seas, is a major oil production area. This area contains State and Federal lands that border the proposed CH waters. ANS production is primarily onshore in State lands adjacent to the proposed Arctic ringed seal CH. Approximately six percent of current ANS production comes from offshore facilities within proposed CH, primarily in State of Alaska waters. However, as onshore ANS production areas drain into the proposed CH, pollution from various potential sources associated with ANS activities, such as hydrocarbon or other spills, have the potential to affect the proposed CH. Depending upon the location and type of onshore oil and gas activities (such as increased marine traffic or construction, maintenance, and use of ice roads), there may be other effects on the proposed CH.

In fiscal year 2012, ANS onshore and offshore oil production totaled over 212 million barrels. This corresponded to an average production of 579.1 thousand barrels per day (bpd), accounting for almost 98 percent of Alaska's total oil and gas output. The resulting oil and gas revenue for Alaska totaled $8.9 billion, which accounts for 93 percent of the State's unrestricted general fund revenue.[89] Of the 579.1 thousand bpd produced in ANS in 2012, 315.9 thousand bpd came from units producing on land with leases that include State waters within proposed CH. Production platforms actually located within CH boundaries produced a total of 36.5 thousand bpd, of which 24.0 thousand bpd came from leases located entirely in State waters (within three miles of shore), while the other 12.5 thousand bpd came from leases straddling both State and Federal waters (these Beaufort Sea leases are co-managed by State and Federal agencies).[90]

Currently, the majority of oil production occurs in the Prudhoe Bay oil field in the North Slope Borough, which was discovered in 1968. Prudhoe Bay originally contained over 25 billion barrels of oil, making it the richest oil field in all of North America.[91] Infrastructure to bring these reserves to market was quickly developed and the Trans-Alaska Pipeline System (TAPS) started delivering ANS oil to the ice free harbor of Valdez in 1977. Oil production from ANS fields peaked in 1988, when over 2 million barrels of oil flowed through TAPS every day. Production from ANS onshore fields has been declining steadily since the late 1980s.

This decline is expected to continue into the future with estimated production falling to 442.9 thousand bpd by 2018. **Table 5-12** shows historical and projected ANS production from 1978 to 2018. Production in 2022 is anticipated to fall even further to 338.5 thousand bpd. As shown in the table, extraction has been declining in almost all areas, with the exception of new production at Point Thomson and new offshore production at Endicott. Development of offshore facilities, especially in untapped outer continental shelf (OCS) areas of the Beaufort Sea, is where future production increase is likely to occur.

[89] State of Alaska Department of Revenue. December, 2012. Department Releases Revenue Source Book. Website: http://www.revenue.state.ak.us/Press%20Releases/12-010%20Fall%202012%20RSB%20Press%20Release%2012-4-2012.pdf.

[90] Alaska Department of Revenue Tax Division. December 2012. *Alaska Oil Production History FY 1959-2012*. Website: http://www.tax.alaska.gov/sourcesbook/AlaskaProduction.pdf.

[91] Factsheet: Prudhoe Bay. BP, August 2006.

Table 5-12 Alaska North Slope Oil Production by Lease Area

	Production Year (Average in Thousands of Barrels per Day)				
Lease Location Leases entering CH waters	**1978**	**1988**	**1998**	**2008**	**2018**
Onshore production with leases entering State Waters					
Prudhoe Bay	786.9	1602.6	704.2	291.1	218.1
Point Thomson	0.0	0.0	0.0	0.0	6.7
PBU Satellites	0.0	0.0	53.6	67.5	33.3
Offshore platform production in State Waters					
Endicott	0.0	77.1	57.2	14.1	7.6
Offshore platform production with leases entering Federal Waters					
Offshore	0.0	0.0	0.0	34.4	21.8
Onshore production from leases outside CH Boundaries					
Alpine	0.0	0.0	0.0	114.9	47.3
NPR-A	0.0	0.0	0.0	0.0	0.1
GPMA	0.0	37.4	151.7	44.3	17.7
Kuparuk	0.0	287	260.4	112.6	71.7
Kuparuk Satellites	0.0	0.0	28.0	36.5	18.6
Total, All Leases	**786.9**	**2004.1**	**1225.2**	**715.4**	**442.9**

Source: Alaska Department of Revenue ANS & Cook Inlet oil Production FY 1978-2013

Onshore ANS production decline along with rising oil prices has spurred interest in developing the expected offshore oil resources in the Beaufort Sea OCS and the Chukchi Sea OCS. Although as yet largely not in production, Federal Arctic OCS waters, located within the proposed CH boundaries, are projected to contain vast oil and gas resources. Recent Bureau of Ocean Energy Management (BOEM) lease sales in 2007 (Beaufort Sea) and 2008 (Chukchi Sea) showed increased industry interest in Arctic OCS regions within proposed Arctic ringed seal CH.[92] Exploration is occurring, and BOEM has planned another round of lease sales for 2016 and 2017 in the Chukchi and Beaufort seas. Together, the Chukchi and Beaufort seas are estimated to contain 42.18 billion barrels of oil equivalent (boe), over 97 percent of the estimated OCS oil resources in Alaska.[93]

The Beaufort Sea OCS is estimated to contain 8.22 billion barrels of technically recoverable oil and 26.74 thousand cubic feet (Tcf) of natural gas (as there has been little exploration in the area, these estimates are based on geologic, geophysical, and engineering data and modeling).[94] The currently undeveloped Chukchi Sea OCS is thought to have even greater resource potential. Estimates anticipate 15.38 billion barrels of technically recoverable oil and 76.77 Tcf of natural gas.[95]

[92] Northern Economics. 2009. Economic Analysis of Future Offshore Oil and Gas Development: Beaufort Sea, Chukchi Sea, and North Aleutian Basin, prepared for Shell Exploration and Production.

[93] Bureau of Ocean Energy Management. *Factsheet: Outer Continental Shelf (OCS) Oil and Gas Leasing Program for 2012-2017*.

[94] Minerals Management Service. 2006. Alaska Federal Offshore. *Undiscovered Oil and Gas Resources.*

[95] Bureau of Ocean Energy Management. 2012. *Factsheet: Outer Continental Shelf (OCS) Oil and Gas Leasing Program for 2012-2017*.

Development of these regions could help offset declining onshore oil production, and maintain adequate TAPS throughput in the future. TAPS was originally designed to move 1.5 million bpd, and is currently operating at about 39 percent of this capacity. Studies performed by the pipeline operator, Alyeska Pipeline Service Company, identified potential challenges at throughput between 300,000 and 600,000 bpd. There are mitigation measures, such as using heaters along the pipeline to keep oil flowing, which can offset these problems if throughput doesn't increase.[96]

In addition to oil reserves, ANS contains substantial natural gas deposits. However, commercial production of natural gas from the ANS is not feasible until a natural gas pipeline is constructed. Developing such a pipeline has been discussed since the 1970s.

The remainder of this section describes oil and gas management, including information on the Federal nexus and the leasing process, and then describes current and projected future exploration, development, and production activities within and adjacent to proposed Arctic ringed seal CH.

5.4.1.1 Oil and Gas Management: Federal Nexus

Oil and gas activities within and adjacent to the proposed Arctic ringed seal CH fall under State and Federal management. The Alaska Department of Natural Resources (ADNR) Division of Oil and Gas manages all oil and gas activities within three miles of the shoreline, including nearshore areas in the Beaufort Sea. Oil and gas activities in areas farther than three miles offshore are considered part of the OCS and are permitted and regulated by the Federal BOEM. The BOEM manages the exploration and development of offshore resources by balancing economic development, energy independence, and environmental protection through oil and gas leases, renewable energy development, and environmental reviews and studies. In the Chukchi Sea there is a 25-mile nearshore deferral zone where no leasing or development activities are currently allowed due to its importance for Native Alaskan subsistence use.[97] The OCS region beyond this buffer zone falls under BOEM jurisdiction.

The proposed CH includes five BOEM planning areas (See **Figure 5-7**): St. Matthew-Hall, Norton Basin, Hope Basin, Beaufort Sea, and Chukchi Sea. St. Matthew-Hall, Norton Basin, and Hope Basin are excluded from BOEM leasing plans due to low resource potential and/or low support for potential new leasing. The Beaufort Sea and Chukchi Sea planning areas are the only areas with existing or planned leases within the proposed Arctic ringed seal CH.

[96] Alyeska Pipeline Service Company. 2011. *Low-Flow Impact Study*. Website: http://www.alyeska-pipeline.com/TAPS/PipelineOperations/Low Flow . Accessed 2013.

[97] Bureau of Ocean Energy Management. 2012. *Factsheet: Alaska OCS Leasing Strategy*.

Figure 5-7

Northern Alaska BOEM Planning Areas by Lease Potential

Chukchi Sea

Beaufort Sea

Hope Basin

Norton Basin

St. Matthew-Hal

Navarin Basin

St. George Basin

RUSSIA

CANADA

Alaska

Legend

Proposed Ringed Seal Critical Habitat

BOEM Planning Area

BOEM Planning Area Boundary

Leasing Consideration 2012-2017 Program

Low Resource Potential and/or Low Support for Potential New Leasing

Deferral Area (no leasing or development activities are allowed due to the area's importance for Native Alaskan subsistence use)

0 50 100 200
Miles

Data Sources: National Marine Fisheries Service, BOEM

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The OCS Lands Act provides for the jurisdiction of the U.S. over the submerged lands of the OCS and authorizes the Secretary of the Interior to lease them for certain purposes. It requires that all operations on the OCS be conducted in a safe manner by trained personnel using technology, precautions, and techniques sufficient to prevent or minimize the likelihood of blowouts, loss of well control, fires, spillage, physical obstruction to other users, or other occurrences that may cause damage to the environment, property, or endanger life or health. It gives the Secretary the right to cancel a lease or permit at any time if he/she determines that continued activity pursuant to that lease or permit would probably cause serious harm or damage to life (including fish and other aquatic life), property, any mineral, national security or defense, or to the marine, coastal, or human environment.

The BOEM issues permits for oil and gas exploration activities, called geological and geophysical (G&G) permits. Permits require that all G&G activities for mineral exploration or scientific research must not: interfere with or endanger operations under any lease or right-of-way or permit issued or maintained pursuant to the OCS Lands Act; cause harm or damage to aquatic life or to the marine, coastal, or human environment; cause pollution; create hazardous or unsafe conditions; unreasonably interfere with or harm other uses of the area; or disturb archaeological resources. The BOEM has issued 11 G&G permits since 1997 for the Beaufort Sea OCS and six G&G permits for the Chukchi Sea OCS since 2006.[98]

As discussed in **Section 5.3.1.1**, NMFS is responsible for issuing authorizations for incidental "takes" under the MMPA. **Table 5-13** summarizes IHAs and ITRs issued by NMFS for activities associated with Arctic OCS oil and gas development since 2006.

Table 5-13 Ice Seal MMPA Oil and Gas Related IHAs and ITRs Issued from 2006-2012

Company	Activity	Location of Permitted Activity			
		Chukchi	Beaufort	Chukchi and Beaufort	All Areas
BP	Facility operation		1		1
	Surveys		2		2
Shell	Surveys	1	1	3	5
	Exploratory drilling	1	1		2
ASRC Energy Services	Surveys	1			1
Conoco-Phillips	Surveys	2	1		3
PGS Onshore	Surveys		1		1
Statoil	Surveys	2			2
ION Geophysical	Surveys			1	1
FEX L.P.	Barging operations		2		2
GX Technology (ION)	Surveys	1			1
Kuukpik/ CGG Veritas	Surveys		2		2
Total	**All**	**8**	**11**	**4**	**23**

State and Federal Oil and Gas leasing Process

[98] Bureau of Ocean Energy Management. 2013. Alaska G&G Permits. Website: http://w ww.boem.gov/About-BOEM/BOEM-Regions/Alaska-Region/Resource-Evaluation/Permits/Index.aspx. Accessed 2013.

The BOEM implements a leasing process that uses scientific information and stakeholder feedback to determine which specific areas offer the greatest resource potential while minimizing conflicts with environmental and subsistence considerations.[99] Lease sales are managed according to a five-year leasing plan designed to balance social, economic, and environmental considerations. The most current five-year lease plan is for the 2012 through 2017 period. Lease sales in the Beaufort Sea and Chukchi Sea were pushed back to the end of the period, 2016 and 2017, in order to complete further impact analysis. The BOEM is planning on holding a lease sale in the Chukchi Sea in 2016 of up to 36 million acres, and one in the Beaufort Sea of up to 32 million acres in 2017. The exact lease sale area within the larger planning area is yet to be determined. Once leases are purchased, lease owners can apply for exploration permits and retain the right to develop a resource if economically viable deposits are discovered.

In developing the five-year OCS leasing plan, the BOEM considers societal net benefits for each planning unit. Net benefits are estimated as the market value of oil and natural gas resources, plus consumer surplus benefits, minus industry production costs and social and environmental costs.[100] The *2012-2017 BOEM Programmatic Environmental Impact Statement* anticipates net benefits from the development of oil and gas resources in the Chukchi Sea OCS to range from $8.07 billion to $161.28 billion ($39.54 billion as the mid-level value), with the value difference due to different fuel price assumptions. Estimates for the net benefits of OCS development in the Beaufort Sea range from $1.28 billion to $25.71 billion ($6.14 billion is the mid-level value).[101] In terms of relative environmental sensitivity, the BOEM determined the Chukchi OCS to be "less sensitive to impact"[102], while the Beaufort OCS was evaluated as "more sensitive to impact".[103]

All BOEM lease sales include environmental controls on lease operations. Additionally the Bureau of Safety and Environmental Enforcement (BSEE) has broad permitting and monitoring authority over lessees. Permits require use of the best available and safest technologies during exploration, development, and production. They also require various measures to avoid environmental damage. Monitoring occurs over the life of the lease ensuring safe, clean, and compliant operations throughout.[104]

On November 9, 2009 the ADNR Department of Oil and Gas released the *Beaufort Sea Areawide Oil and Gas Lease Sale Final Finding of the Director.* This document applies to Beaufort Sea lease sales in State waters which will occur between 2009 and 2018. The director found that holding lease sales is in the best interest of the State of Alaska, and decided to offer all available State owned acreage in the Beaufort Sea for lease over this period.[105]

State lease sales are held on an annual basis. Before any oil and gas lease sale is executed, the ADNR must prepare a written document on whether the sale is in the best interest of the state. This document describes the existing environment; assesses the potential effects of issuing leases; lists the applicable laws and regulations to oil and gas exploration, development, production, and transportation; and

99 Bureau of Ocean Energy Management. July, 2012. *Outer Continental Shelf Oil and Gas Leasing Program: 2012-2017 Final Programmatic Environmental Impact Statement.*

100 Bureau of Ocean Energy Management. November, 2011. *Proposed Final Outer Continental Shelf Oil and Gas Leasing Program 2012-2017*.

101 These net benefit estimates include the estimated cost of constructing a gas pipeline; natural gas is assumed to be commercially viable if a large-volume transportation system pipeline is built and oil production provides funding for much of this infrastructure.

102 Bureau of Ocean Energy Management. November, 2011. *Proposed Final Outer Continental Shelf Oil and Gas Leasing Program 2012-2017*.

103 Ibid.

104 Ibid.

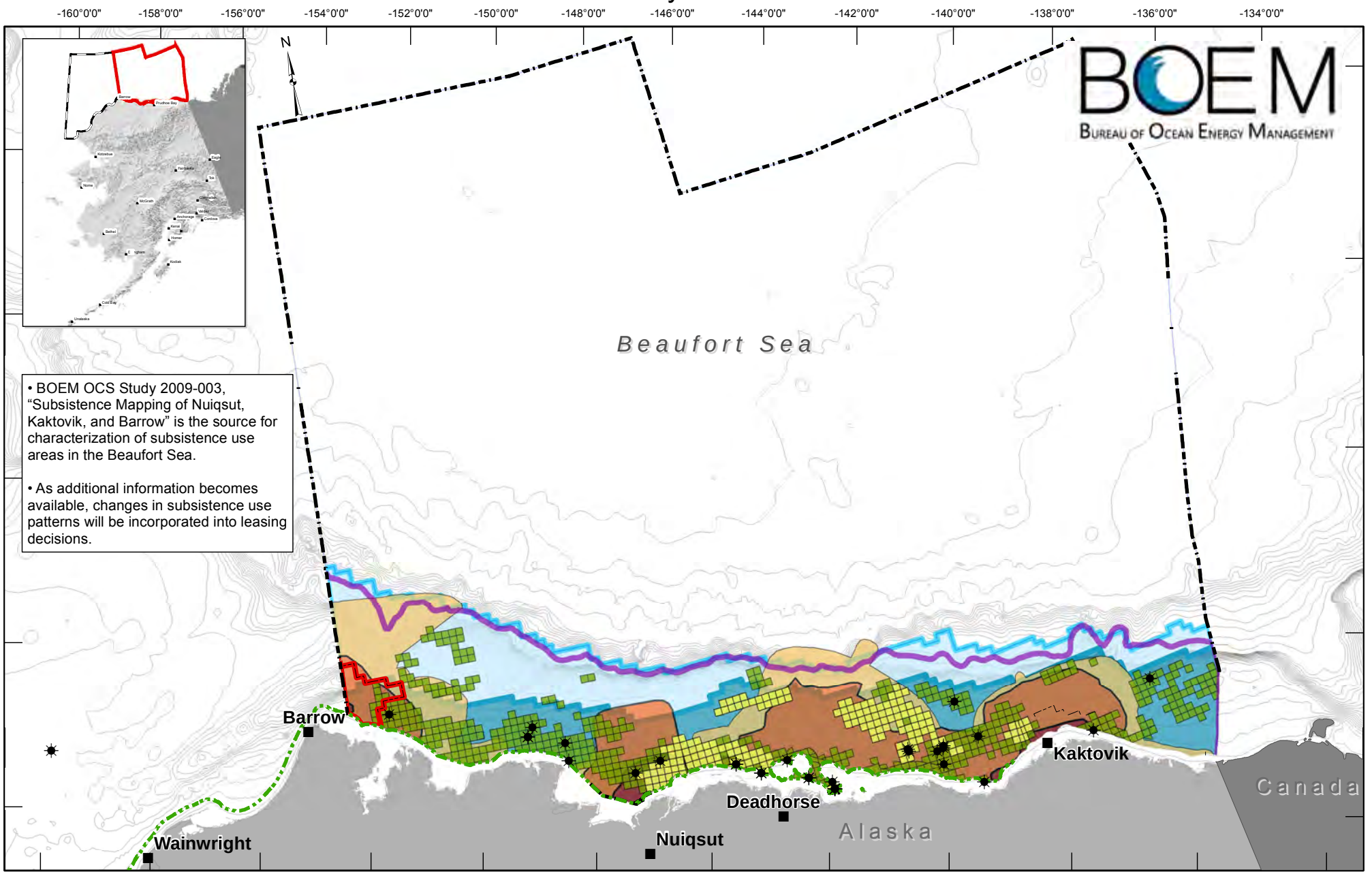
105 Alaska Department of Natural Resources. Division of Oil and Gas. November, 2009. *Beaufort Sea Areawide Oil and Gas Lease Sale: Final Finding of the Director.*

describes mitigation measures with which lessees must comply. Mitigation measures identified in the best interest finding must be included as terms of the lease.

State and Federal leasing decisions are based on several analytical factors including environment, critical species habitat, intensity of subsistence activities, and hydrocarbon potential. The following figures depict a geospatial analysis assessing these various factors in the Beaufort and Chukchi leasing areas. In the Beaufort Sea, the areas containing high petroleum potential are within 75 miles of the shoreline. This zone contains historical and active leases as well as important areas for subsistence use. In the Chukchi Sea, the majority of high petroleum potential is farther offshore. Most of the historical and all of the active leases fall in this region, between 25 and 200 miles offshore. There is a 25-mile deferral zone, where no current leasing is occurring, that contains most of the area's subsistence use and spectacled eider CH.

Figure 5-8

Beaufort Sea Analytical Considerations



Coordinate System: NAD 1983 UTM Zone 3N

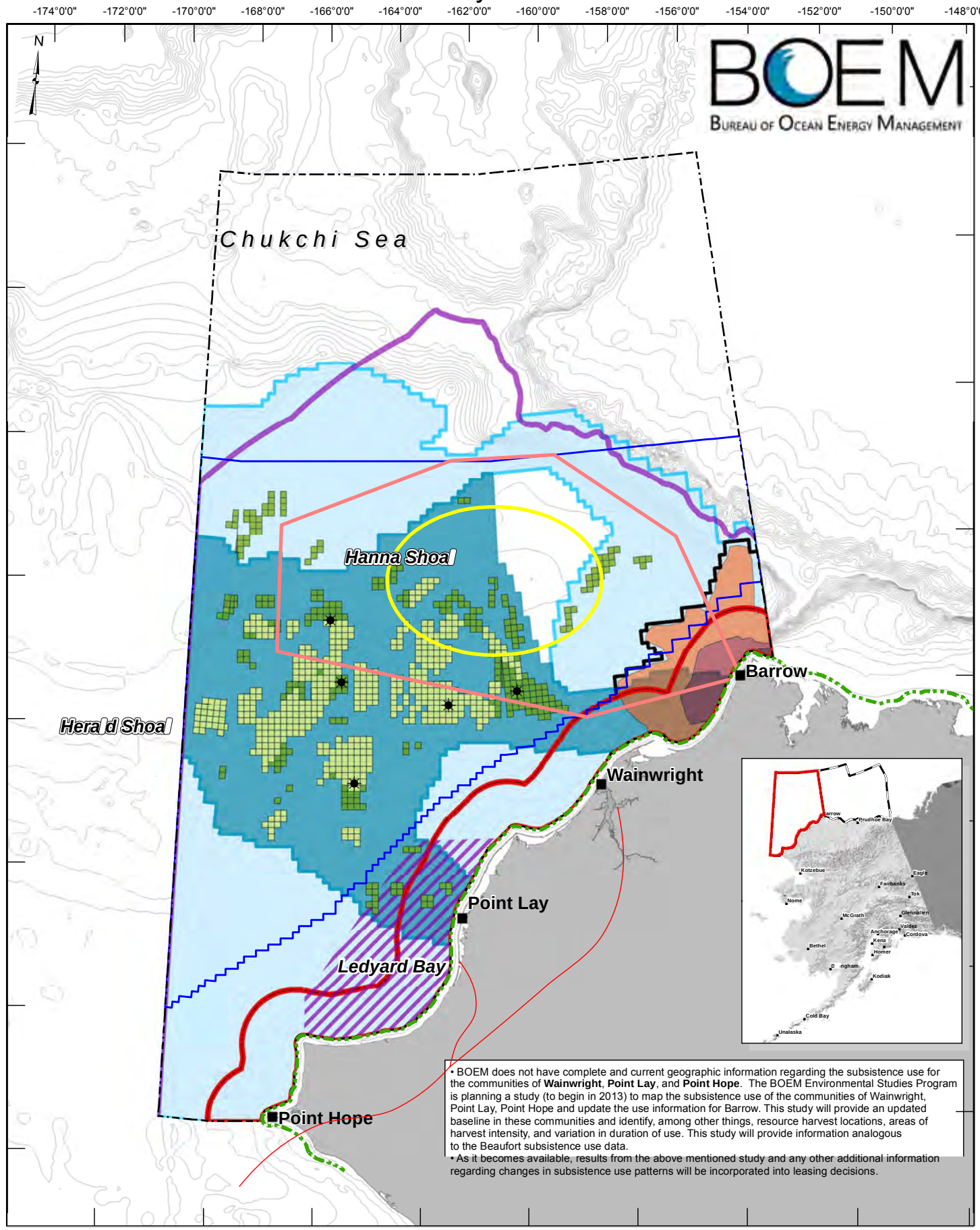
0 12.5 25 50 75 100 Miles

1:3,500,000

- Beaufort Planning Area
- Fed-State Boundary
- Excluded from 2012-2017 Scoping
- OCS Wells
- OCS Active Leases
- OCS Historical Leases
- Polar Bear Critical Habitat - Seaward Extent
- High Petroleum Potential
- Medium Petroleum Potential
- Low Petroleum Potential
- Subsistence, High Use
- Subsistence, Medium Use
- Subsitence, Low Use
- Bathymetry (10 meter intervals)

An interactive version of the data depicted here can be found by referencing the "BOEM MMC Mapping Tool - Arctic" map on the Map Gallery Page on MarineCadastre.gov. Or go direct to: http://www.marinecadastre.gov/MMC%20Pages/gallery.aspx

Chukchi Area Analytical Considerations



An interactive version of the data depicted here can be found by referencing the "BOEM MMC Mapping Tool - Arctic" map on the Map Gallery Page on MarineCadastre.gov. Or go direct to: http://www.marinecadastre.gov/MMC%20Pages/gallery.aspx

5.4.1.2 Current Oil Production

Onshore oil production in the ANS has been the primary oil producing region in Alaska since the discovery of oil at Prudhoe Bay in 1968. In 2012, the three largest producing oil and gas units in Alaska (Prudhoe Bay, Kuparuk, and Colville River) were all located in this region, and accounted for almost 87 percent of state oil production.[106] The ANS also has two large Federal tracts of land. The National Petroleum Reserve Alaska (NPR-A) has limited oil and gas leasing and no production. The Arctic National Wildlife Refuge (ANWR) is not offered for oil and gas leasing, exploration, or development.

There are currently seven active oil and gas units that include State waters in the Beaufort Sea within the proposed Arctic ringed seal CH (a unit is composed of a group of leases covering all or part of a deposit of oil or gas; **Figure 5-10**). These include four producing units located entirely in State offshore waters and one unit that includes both State and Federal waters. Within the proposed CH, there are also four units that include State waters and one unit located entirely offshore in Federal waters where leases are under development.

Offshore oil production in the Beaufort Sea occurs on manmade gravel islands. Wells are drilled from these island platforms to extract oil from surrounding leases. Extracted resources are transported to shore via causeways, ice roads, and subsea pipelines where they make their way into TAPS and eventually to market. All production in the ANS and adjacent waters utilizes three different types of wells to obtain oil. The production well is where oil and gas is extracted from the reservoir. Additionally there are injection wells designed to maintain reservoir pressure. Here water and extracted gas are pumped back into the reservoir, replacing pressure and maximizing the amount of oil extracted.[107]

Processing facilities are needed to support oil extraction. When a production well (onshore or offshore) brings fluids to the surface they are a mixture of oil, gas, and water. Facilities must separate the water, gas, and oil. The resulting water can be re-injected into the reservoir and the oil transported to TAPS. Gas is piped to a gas processing facility which removes heavy natural gas liquids to send through TAPS. Some gas is also used to power on-site field operations, but over 90 percent of the gas is typically re-injected into the reservoir.[108]

This section summarizes information on the current and anticipated future units with leases that are within the proposed Arctic ringed seal CH. **Figure 5-10** shows the units discussed below.

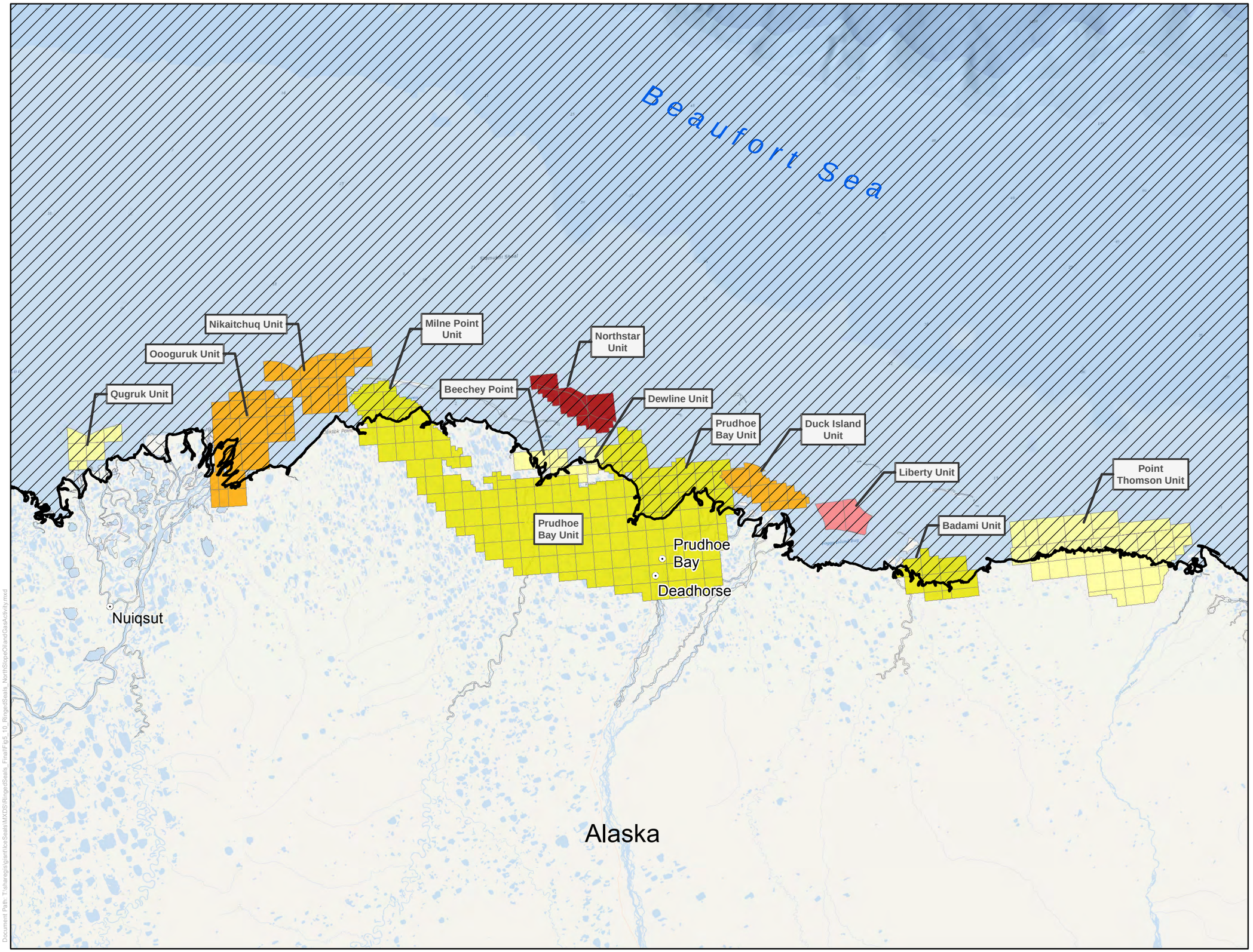
[106] Alaska Department of Revenue Tax Division. December, 2012. *Alaska Oil Production History FY 1959-2012.* Website: http://www.tax.alaska.gov/sourcesbook/AlaskaProduction.pdf.

[107] Alaska Department of Administration. Alaska Oil and Gas Conservation Commission. *AOGCC: 50 Years of Service to Alaska*. Website: http://doa.alaska.gov/ogc/WhoWeAre/50th/aogcc50thBooklet.pdf. Accessed April 22, 2013.

[108] Ibid.

Figure 5-10

Beaufort Sea Oil and Gas Units



Legend

Proposed Ringed Seal Critical Habitat

Joint Federal/State Producing Offshore Units
Northstar

Federal Planned Offshore Units
Liberty

State Offshore Producing Units
Endicott (aka Duck Island)
Oooguruk
Nikaitchuq

State Onshore Producing Units Entering CH
Badami
Milne Point
Prudhoe Bay

State Planned Onshore Units Entering CH
Beechey Point
Dewline
Qugruk
Point Thompson

0 5 10 20
Miles

Data Sources: National Marine Fisheries Service, Division of Oil and Gas State of Alaska

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Units Onshore With Leases that Include State Waters Within Proposed CH

The Prudhoe Bay Unit is the largest producer of oil in the North Slope. The majority of acreage and facilities are located onshore, but the lease extends into State-regulated Beaufort Sea waters. Production in January 2012 from Prudhoe Bay and its satellite facilities averaged 324,727 bpd. The facility is operated by BP Exploration Alaska Inc. with ExxonMobil, ConocoPhillips and Chevron all holding working interests. At the end of 2010 there were over 1,500 wells in Prudhoe Bay and its satellite fields. It is estimated that this field still contains 2 billion barrels of recoverable oil and 26 Tcf of natural gas.[109]

The Badami Unit is located east of Prudhoe Bay and spans both onshore and offshore State lands. Savant Alaska LLC has been operating this unit since it took over from BP in 2010. Production in January 2012 averaged 1,042 bpd. This unit has an estimated recoverable reserve of 33 million barrels of oil. Production is from five wells (with possible future addition of two more) on a single well pad with an integrated production facility.[110]

The Milne Point Unit is located northwest of Prudhoe Bay and draws on onshore and offshore reservoirs within State jurisdiction. This producing unit is operated by BP Exploration Alaska Inc. and in January 2012 produced about 20,000 bpd. Milne Point originally had 3.1 billion barrels of oil reserves, but has been producing since the eighties. The Milne Point unit contains 138 oil producing wells and 92 gas or water injector wells.[111] This unit also contains the Milne Point heavy oil project, a $100 million pilot project which BP expects to result in three to five years of production. Heavy oil is not currently commercially produced in Alaska as it requires further processing and likely new technologies, but large reserves (18 to 27 billion bbls) are present in the ANS.

Units Offshore With Leases Entirely in State Waters Within Proposed CH

The Endicott Unit is produced from an offshore island located to the northeast of Prudhoe Bay. It is currently producing approximately 10,000 bpd. This unit was originally estimated to have 1 billion barrels of oil reserves, but has been producing since 1987. Production facilities are located on two artificial islands with a causeway connecting the islands to shore. This unit has 60 oil producing wells and 26 gas or water injector wells. It is operated by BP Exploration Alaska Inc.[112]

The Oooguruk Unit is near Harrison Bay within the Beaufort Sea west of Prudhoe Bay and is thought to contain 120 million to 150 million boe. Production facilities and wells are located on a six-acre gravel island. Peak production in this unit ranges from 15,000 to 20,000 bpd. Produced fluids are transported to shore in a subsea flow-line, and the site contains 40 horizontal wells. Approximately half of the wells are production wells and the rest are injection wells. This unit is operated by Pioneer Natural Resources Alaska.[113]

The Nikaitchuq Unit is located in nearshore Beaufort Sea waters northwest of Milne Point and Prudhoe Bay. This unit is operated by ENI U.S. Operating Company Inc. and was producing 7,315 bpd in January 2012. Development is ongoing and 23 of 52 planned wells had been drilled as of March 2012. This unit uses a pipeline bundle to carry oil from its Spy Island drill site to an onshore processing plant.[114]

Offshore Units With Leases in Federal Waters Within Proposed CH

The Northstar Unit, operated by BP Exploration Alaska Inc., is located entirely offshore to the north of Prudhoe Bay. Its lease includes not only State but also significant Federal OCS acreage. Oil production

[109] Anchorage Economic Development Corporation (AEDC). 2012. *Resource Extraction 10-Year Project Projection*.

[110] Ibid.

[111] Ibid.

[112] Ibid.

[113] Ibid.

[114] Ibid.

occurs from an artificial island. Northstar currently produces 12,500 bpd annually. Original reserves are estimated at 310 million barrels and the unit has been producing since 2001. The Northstar Island is located in about 39 feet of water and uses a 6-mile sub-sea pipeline to transport oil to land. It supports 19 oil producing wells and 8 gas or water injector wells.[115]

5.4.1.3 Future Oil Production

Future oil and gas production within the proposed Arctic ringed seal CH and surrounding areas depends largely on technological advances. Recent advancements in exploration and production technologies have increased interest in developing OCS resources, potentially offsetting at least some of the declines in ANS output. Arctic OCS operations present challenges due to weather and water depth. The presence of pack ice throughout much of the year makes drill ships with ice breaker support vessels the likely method of exploration. Operations occur during the open water season (July to October) and industry analysis suggests that one drill ship could drill one or two wells over this period.[116] In the Beaufort Sea, development drawing on existing infrastructure and major production could begin as soon as 2017.[117]

Development in the Chukchi Sea will likely require new drilling and production technologies, as well as significant investment in pipeline and support infrastructure. There are currently no platforms operating in conditions similar to the Chukchi Sea, where year-round ice movements and seafloor depths of over 100 feet make operation challenging.[118] Structural designs for platforms have been proposed that utilize a wide base platform, anchoring system, and ballast in concrete cavities to stabilize and resist ice forces.[119] The *Arctic Offshore Technology Assessment of Exploration and Production Options for Cold Regions of the US Outer Continental Shelf* determined such bottom-founded structures would be safe and economical in waters of up to 200-250 feet in depth in the Chukchi Sea.[120] Using subsea wells and pipelines installed under the seafloor could greatly expand the reach of offshore platforms. Extracted fluids could be processed on the platforms with re-injection prior to transport of oil. Miles of onshore and offshore pipeline and supporting infrastructure would be required to bring oil to TAPS. Economically feasible development scenarios are consequently based upon the discovery and development of large reserves.[121]

Extended reach drilling is a new technology which is allowing producers to extract oil from a variety of deposits while minimizing environmental disturbance. This method allows a well to be drilled laterally several miles away from the drill rig. It can allow production of deposits located three to four miles away from the drilling platform, thereby increasing the range of extractable deposits.[122] This can reduce the need for building new offshore facilities as offshore deposits can be accessed from shore or existing offshore facilities within the extended reach drilling range.

This section describes expected oil and gas production in offshore State and Federal waters within the proposed Arctic ringed seal CH.

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115 Anchorage Economic Development Corporation (AEDC). 2012. *Resource Extraction 10-Year Project Projection*.

116 Northern Economics. 2009. Economic Analysis of Future Offshore Oil and Gas Development: Beaufort Sea, Chukchi Sea, and North Aleutian Basin, prepared for Shell Exploration and Production.

117 Ibid.

118 Ibid.

119 Ibid.

120 IMV PA. 2008. *Arctic Offshore Technology Assessment of Exploration and Production Options for Cold Regions of the U.S. Outer Continental Shelf.* Project No. C-0506-15.

121 Northern Economics. 2009. Economic Analysis of Future Offshore Oil and Gas Development: Beaufort Sea, Chukchi Sea, and North Aleutian Basin, prepared for Shell Exploration and Production.

122 Alaska Department of Administration. Alaska Oil and Gas Conservation Commission. *AOGCC: 50 Years of Service to Alaska*. Website: http://doa.alaska.gov/ogc/WhoWeAre/50th/aogcc50thBooklet.pdf. Accessed April 22, 2013.

Onshore Units With Leases that Include State Waters within Proposed CH

The Beechey Point Unit is located mostly onshore north of Prudhoe Bay, but with some offshore leases. This unit is operated by Brooks Range Petroleum Corp. and is expected to start production in 2015 or 2016. Five exploration wells are anticipated by 2019 and it is estimated that there are 120 million barrels in reserve potential.[123]

The Dewline Unit is located north of Prudhoe Bay on the east side of Beechey Point. This unit is partially offshore but it is anticipated that all wells can be drilled from onshore locations. It is operated by North Dewline LLC and production is thought possible in 2015. This unit is estimated to have reserves between five and 20 million barrels of oil.[124]

The Qugruk Unit is located both onshore and in nearshore State waters west of Prudhoe Bay within the Colville River Delta. This unit is operated by Repsol E&P USA Inc. and is estimated to contain 1.5 billion barrels of recoverable reserves. Production had been anticipated as soon as 2016; however, setbacks have resulted in only two of nine planned wells being drilled.[125]

The Point Thomson unit, which is located east of Badami adjacent to ANWR, is expected to begin producing in 2015 or 2016. It is operated by ExxonMobil and borders the Beaufort Sea shoreline. This unit is estimated to contain 200 million barrels of condensate and eight Tcf of natural gas.[126]

Offshore Units In Federal OCS Waters Within Proposed CH

The Liberty Unit is located entirely offshore in Federal Beaufort Sea OCS waters. The unit is operated by BP Exploration Alaska Inc. and production is expected after 2013. Output could reach 40,000 bpd and will use existing Endicott facilities and pipelines. It is estimated that this unit holds 100 million barrels of recoverable resources.[127]

In 2008, the Federal government held the first OCS lease sale in the Chukchi Sea since 1991. The sale auctioned over 2.7 million acres of oil and gas leasing blocks, with lease sales totaling over $2.6 billion. Shell purchased $2.1 billion of leases and ConocoPhillips purchased most of the remainder.[128] The combination of litigation, measures resulting from the Deepwater Horizon incident in the Gulf of Mexico, and equipment issues has limited exploratory drilling on OCS leases.[129]

Shell has been conditionally approved to drill up to six exploration wells on Chukchi Sea leases. Shell has also gained conditional approval to conduct exploration drilling on OCS leases in the Beaufort Sea located north of Point Thomson near Camden Bay. Shell had planned to drill five wells in Chukchi and Beaufort OCS leases in 2012, but by the end of the season had only drilled the tops of two wells (one in the Beaufort Sea and one in the Chukchi Sea).[130] Shell's efforts were hampered by lingering sea ice and incidents leaving both its drillship and drill rig requiring repairs.[131]

Continued interest in Arctic OCS development is evident by two other current exploration programs that are in various approval stages with the BOEM. ConocoPhillips has submitted an exploration plan to begin

123 Anchorage Economic Development Corporation (AEDC). 2012. *Resource Extraction 10-Year Project Projection*.

124 Ibid.

125 Ibid.

126 Ibid.

127 Ibid.

128 Ground Truth Trekking. Chukchi Sea Oil and Gas Development. Website: http://www.groundtruthtrekking.org/media-search/?search=shell+exploration. Accessed 2013.

129 Ibid.

130 Ibid.

131 Anderson, Ben. February 27, 2013. Swift reaction as Shell suspends 2013 Arctic Alaska offshore drilling. *Alaska Dispatch*. Website: http://www.alaskadispatch.com/article/swift-reaction-shell-suspends-2013-arctic-alaska-offshore-drilling.

exploratory OCS drilling in the Devil's Paw area of the Chukchi Sea in 2014. Statoil had been planning to drill its first well in the Chukchi Sea in 2014, but has delayed exploration drilling until at least 2015, partly to see the outcomes of Shell's drilling efforts.[132] Statoil is continuing joint scientific research with Shell and ConocoPhillips, as well as work with local communities.

There is a high level of uncertainty regarding the volume and timing of oil production in Federal OCS waters within proposed CH. Two studies provide insight into potential exploration and development scenarios.

The 2013 Supplemental Draft Environmental Impact Statement, Effects of Oil and Gas Activities in the Arctic Ocean, evaluated the effects of foreseeable exploration activities and potential mitigation measures.[133] It considered six alternatives with three levels of projected exploration activity. The range of exploration activity considered is as follows:

> Four to six 2D/3D seismic or controlled source electromagnetic surveys in the Beaufort Sea, and three to five in the Chukchi Sea.

> Three to five site clearance and high resolution shallow hazards survey programs in each sea, each year.

> One on-ice seismic survey in the Beaufort Sea each year.

> One to four exploratory drilling programs in each sea, each year.

A 2009 study, performed by Northern Economics Inc., projected future oil and gas development in the Arctic OCS. These projections were based on best available data and performed using a reasonable set of exploration, development, and production scenarios. Activities were projected out to 2057 and at full development were estimated to create an annual average of 2,800 jobs in the Beaufort Sea and 2,500 in the Chukchi Sea. Data from the study are presented in **Table 5-14**.

Table 5-14 Projected OCS Oil and Gas Activity in Beaufort and Chukchi Seas

Projected OCS Activity in Proposed CH			
Activity	**Beaufort**	**Chukchi**	**Total**
Exploration Wells	47	43	**90**
Offshore Platforms	7	4	**11**
Pipeline Miles	235	680	**915**
Oil Production Begins	2019	2022	
Gas Production Begins	2029	2036	
Production Through 2057			
Oil (billion barrels)	5.1	4.79	**9.89**
Gas (trillion cubic feet)	6.96	7.78	**14.74**

Source: Northern Economics. 2009. Economic Analysis of Future Offshore Oil and Gas Development: Beaufort Sea, Chukchi Sea, and North Aleutian Basin, prepared for Shell Exploration and Production.

[132] Bradner, Tim. September 3, 2012. Statoil delays Arctic offshore drilling; ConocoPhillips says no change. *Alaska Journal of Commerce*. Website: http://www.alaskajournal.com/core/pagetools.php?pageid=31847&url=%2FAlaska-Journal-of-Commerce%2FSeptember-Issue-3-2012%2FStatoil-delays-Arctic-offshore-drilling-ConocoPhillips-says-no-change%2F&mode=print.
Anderson, Ben. February 27, 2013. Swift reaction as Shell suspends 2013 Arctic Alaska offshore drilling. *Alaska Dispatch*. Website: http://www.alaskadispatch.com/article/swift-reaction-shell-suspends-2013-arctic-alaska-offshore-drilling.

[133] National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2013. *Effects of Oil and Gas Activities in the Arctic Ocean Supplemental Draft EIS*. Website: http://www.nmfs.noaa.gov/pr/permits/eis/arctic_sdeis.pdf

5.4.1.4 Natural Gas Production

There are currently no wells operated within proposed Arctic ringed seal CH solely for natural gas production. However, units that include State-regulated Beaufort Sea waters have substantial natural gas deposits. Combined, the onshore and offshore areas within the Prudhoe Bay and Point Thomson units are believed to hold 31.8 Tcf of natural gas and hundreds of millions of barrels of condensate.[134] G&G data suggest there may be much larger deposits of undiscovered recoverable natural gas in Arctic OCS waters. The BOEM estimates that there could be 26.74 Tcf of undiscovered, technically recoverable natural gas in the Beaufort Sea OCS and 76.77 Tcf in the Chukchi Sea OCS. Combined, there could be an estimated 130 Tcf of recoverable natural gas deposits in offshore areas within proposed Arctic ringed seal CH.[135]

Natural gas currently being produced in the ANS and Beaufort Sea is used to facilitate oil production. Some is burned as fuel for oil field activities, but the vast majority is re-injected into reservoirs to maintain pressure and optimize oil production.[136] A small amount of natural gas is sent through TAPS, approximately 30,000 bpd of heavier gas liquids or about 5 percent of total transport. None of the other natural gas produced is available for commercial sale. Large scale natural gas production for use outside of the North Slope will not be feasible unless or until a gas pipeline is constructed.

There has been serious consideration of an ANS natural gas pipeline since the 1970s. In 2007, the governor's Alaska Gasline Inducement Act (AGIA) authorized $500 million in pre-construction subsidies, which were subsequently awarded to TransCanada. In October of 2012, TransCanada (working with ExxonMobil, BP, and ConocoPhillips) released a concept for the natural gas pipeline. It was projected, at that time, to cost $45 billion to $65 billion and would include a gas treatment plant, approximately 800 miles of pipeline, a liquefaction plant, and a storage and tanker terminal. TransCanada estimated that the pipeline would transport 15 million to 18 million metric tons of liquid natural gas, annually, which equates to 2.0 billion to 2.4 billion cubic feet (Bcf) of gas daily.[137] A 2009 Department of Energy report projected the gas pipeline to be completed between 2018 and 2020, although, the Alaska Pipeline Project currently does not provide an expected completion date in its publications.[138]

5.4.2 Mining

Currently, mining activity within the proposed Arctic ringed seal CH is limited to offshore gold dredging in Nome, Alaska. Offshore dredging occurs on claims within three miles of the State shoreline and in two recreational areas: 250 acres located to the west of Nome and 320 acres located to the east of Nome. Dredging operations occur in the summer months, under permits from Alaska Department of Environmental Conservation (ADEC) and the ADNR. **Figure 5-11** shows the location of the Nome offshore dredging site as well as other onshore mines and mineral reserves located in areas draining into proposed CH waters. As shown on the map, there are several reserves near coastal waters that have yet to be developed, as well as numerous mines located in inland areas draining into waters of the proposed CH.

Mining activities in Alaska are regulated primarily by the State, but are also overseen by Federal Agencies such as the EPA and the USACE. Types of state required permits include: waste management, air

[134] Department of Energy. National Energy Technology Laboratory. April, 2009. *Alaska North Slope Oil and Gas, A Promising Future or an Area in Decline.*

[135] Bureau of Ocean Energy Management. *Factsheet: Outer Continental Shelf (OCS) Oil and Gas Leasing Program for 2012-2017*.

[136] Department of Energy. National Energy Technology Laboratory. April, 2009. *Alaska North Slope Oil and Gas, A Promising Future or an Area in Decline.*

[137] Alaska Natural Gas Transportation Projects Office of the Federal Director. February, 2013. *Alaska Natural Gas Pipeline Project History*. Website: http://www.arcticgas.gov/Alaska-Natural-Gas-Pipeline-Project-History.

[138] Department of Energy. National Energy Technology Laboratory. April, 2009. *Alaska North Slope Oil and Gas, A Promising Future or an Area in Decline.*

quality, pollutant discharge, storm water, and temporary use permits. Additionally, various permits from the EPA and USACE may be required.[139]

The ADNR holds lease sales every 10 years for the Nome offshore site, with the next round of lease sales to be held in 2021. Federal permits are not required for these dredging operations, as all mining occurs on State lands.[140] The following figure shows all current active mines as well as known mineral deposits in the State of Alaska.

[139] Alaska Department of Natural Resources. Division of Mining, Land, and Water. 2012. *Large Mine Permitting*. Website*: http://dnr.alaska.gov/mlw/mining/largemine/.*

[140] Alaska Department of Natural Resources. Division of Mining. 2013. *Nome Offshore Mining Information.* Website: http://dnr.alaska.gov/mlw /mining/nome/index.cfm.

Figure 5-11

Mineral Resources in Northern Alaska Coastal Areas

Beaufort Sea

Chukchi Sea

RUSSIA

CANADA

North Slope

Northwest Arctic

Nome

Yukon-Koyukuk

Fairbanks North Star

Southeast Fairbanks

Denal

Matanuska-Susitna

Valdez-Cordova

Wade Hampton

Bethel

Dillingham

Kenai Peninsula

Lake and Peninsula

Lik

Red Dog Creek

Arctic, Ruby, Sun

Bornite

Graphite Creek

Nome Offshore

Goodnews Bay

Norton Sound

Bering Sea

Legend

Mineral Resource Categories

- Major Projects
- Operating Mine
- Past Operating Mine
- Other
- Proposed Ringed Seal Critical Habitat
- Coal Resources
- Placer District - Historic (pre-2004)
- Placer District - Recent Activity

0 75 150
Miles

N

Data Source: Alaska Department of Natural Resources and Division of Geological and Geophysical Surveys

Cardno ENTRIX

Document Path: T:\shareg\gism\IceSeals\MXDS\RingedSeals_Final\Fig5_11_RingedSeals_MineralDeposits.mxd

5.4.3 Ports

Primary port facilities serving summer vessel traffic within the proposed Arctic ringed seal CH include the Port of Nome (medium-draft port), the Port of Kotzebue (shallow-draft port), and the Delong Mountain Terminal Port (shallow-draft port). There are also numerous docks located throughout the proposed CH, servicing barges and small vessels, including at Prudhoe Bay and Barrow.

The Port of Nome is a regional transportation hub located on the southern side of the Seward Peninsula in Norton Sound. It is the closest U.S. port to the Bering Straits. Activity at the Port of Nome has increased in recent years with large barges, fishing boats, and gold dredgers competing for space at the City dock and berthing facilities.[141] In 2006, the USACE completed the Nome Harbor Improvements Project that added a breakwater and increased the length of the Causeway. The Port has applied for funding for additional port and harbor expansion, including increasing the harbor depth and constructing a third large dock. The funding and timeline for these projects are uncertain. Also, the USACE has prepared an Environmental Assessment to conduct annual maintenance dredging of the Nome Harbor Entrance Channel and basin for the period 2013 through 2022. This Federal project will maintain safe access to the harbor.[142]

The Port of Kotzebue, located approximately 180 miles northeast of the Port of Nome on Kotzebue Sound, is a shallow draft port. Vessels resupplying the community often must transfer cargo (such as fuel) to smaller vessels that can navigate the shallow waters of Kotzebue Sound, which increases costs of such supplies. To lower the cost-of-living and spur economic development, the City of Kotzebue is working towards development of a deep water port. The Port has received grant funding to fund planning and initial construction work of a road to access a potential deep-draft port site at Cape Blossom.[143] Similar to Nome, the funding and timeline for port construction at Cape Blossom are very uncertain.

The Delong Mountain Terminal Port is used to transport lead and zinc concentrate from the Red Dog mine, which is located near Kotzebue. Concentrate is stored year-round at the terminal site, and in the summer months is loaded onto barges and transported to ships anchored offshore. The terminal is owned by the Alaska Industrial Development and Export Authority (AIDEA), but is operated by Teck Resources Limited that owns the Red Dog mine. Zazu Metals Corporation, which is planning to mine lead and zinc from the Lik deposit near the Red Dog mine, is currently in discussion with AIDEA on terms to use the terminal as well. Although discussions are in the early stages, Zazu expects that within the next five to ten years, onshore storage facilities at the terminal will be expanded.[144] It is possible that in-water facilities may be expanded or improved as well, but construction of in-water facilities is not a focus of current negotiations.

Several significant planning efforts are underway to expand existing ports and establish new ports in the Alaskan Arctic to meet the projected growth in Arctic vessel activity, to facilitate resource development, and to enhance re-supply of goods to communities in the region. For example, in 2012 the Alaska State Legislature's Alaskan Northern Waters Task Force proposed 11 potential Arctic deep- and medium-draft port sites, nine of which are located in proposed Arctic ringed seal CH: Cape Thompson, Mary Sachs Entrance, Prudhoe Bay, Barrow, Point Franklin, Wainwright, Kotzebue/Cape Blossom, Nome/Teller, and

[141] Hobson, Margaret Kriz. November 19, 2012. Arctic Drilling: Coastal Towns Eager For Ports As Ice Melts, Ocean Traffic Picks Up. *E&E Publishing, LLC.* Website: http://eenews.net/public/energywire/2012/11/19/1.

[142] U.S. Army Corps of Engineers. Alaska District. 2012. *Environmental Assessment and Finding of No Significant Impact for Maintenance Dredging of Nome Harbor Entrance Channel*. *Website*: http://www.poa.usace.army.mil/Portals/34/docs/civilworks/publicreview/NomeHarborOMDredgingEAOct2012.pdf.

[143] Brehmer, Elwood. November 2, 2012. Nome, Kotzebue Projects Move Ahead, Await Bond Vote. *Alaska Journal of Commerce*. Website: http://www.alaskajournal.com/Alaska-Journal-of-Commerce/November-Issue-1-2012/Nome-Kotzebue-projects-move-ahead-await-bond-vote/.

[144] Langner, Ralph, Chief Financial Officer. Zazu Metals Corporation. Personal communication with Barbara Wyse, Senior Project Economist, Cardno ENTRIX, April 17, 2013.

St. Lawrence Island (if located on the north shore of the island).[145] Recently, state lawmakers named a separate commission to narrow down the candidate sites and identify how the ports could be funded. Also, the USACE and the Alaska State Department of Transportation and Public Facilities jointly sponsored a three-year study to enhance the Alaska Deep-Draft Arctic Port System. The first phase of the study, completed in 2012, identified 14 candidate sites. Based on evaluation of each site's physical suitability, this study identified a short list of four sites for an Arctic deep draft port: Nome, Port Clarence/Teller, Cape Darby, and Barrow. The report recommended an initial feasibility level study of the Nome/Port Clarence region.

5.4.4 Commercial Fisheries

There is extensive, year-round commercial harvest of groundfish in the Bering Sea, with some commercial harvest in the areas of the northern Bering Sea within the proposed Arctic ringed seal CH. Currently, recorded commercial catch from waters in the proposed Arctic ringed seal CH includes flatfish, halibut, Pacific cod, pollock, crab, and salmon. As noted in **Section 5.3.1**, there is currently no commercial fishing of federally-managed fisheries in the Chukchi and Beaufort seas due to limited data on fish populations in these waters. However, as more data become available in the future, commercial fishing may be allowed in these waters. Also as fisheries migrate northward, following target stocks that expand their range as climatic and oceanographic conditions change, total tonnage and species caught within Bering Sea waters of the proposed CH may increase. This section describes management of all primary species commercially harvested within the Bering Sea, then provides available data on the tonnage and value of fish currently harvested commercially within State and Federal management areas in the proposed Arctic ringed seal CH.

5.4.4.1 Management of Commercial Fisheries: Federal Nexus

Fisheries in and off Alaska are collaboratively managed by the State, the Federal government, and through international cooperation. ADF&G has jurisdiction to manage commercial fisheries (except Pacific halibut fisheries) within three miles of the shoreline. NMFS manages fisheries in the EEZ, between 3 miles and 200 miles from the shoreline. NMFS enforces commercial harvest limits established by the North Pacific Fisheries Management Council (NPFMC). The ADF&G enforces harvest allocations set by the Alaska Board of Fisheries (BOF).

Management of fish species that are present in both State and Federal waters is typically allocated to either a State or Federal agency. For example, NMFS defers management of salmon fisheries in Federal waters to the State of Alaska, while retaining Federal oversight.[146] Groundfish fisheries, including cod, a large number of flatfish species, a similar variety of rockfish and 'other' species, and pollock, are generally managed by NMFS. King crab, Tanner crab, and snow crab fisheries are jointly managed by ADF&G and NMFS. All commercial halibut fisheries in and off Alaska, from zero to 200 nautical miles, are managed by NMFS, under terms of the International Pacific Halibut Commission (IPHC).

Federal fisheries are managed in accordance with 50 CFR Part 679: Fisheries of the EEZ off Alaska. Every Federally managed species has an FMP, which requires a stock assessment and fishery evaluation (SAFE) to be prepared each year. The NPFMC uses the FMPs, as amended, and SAFE evaluations to determine the total allowable catch (TAC) for the various commercial fisheries, by area, by target species.

Increasing numbers of Federal fisheries in and off of Alaska have come under one or another form of dedicated allocations. Many rely upon a catch share system, wherein, after a TAC is set, individual

[145] Alaska State Legislature. Northern Waters Task Force. 2012. *Findings and Recommendations of the Northern Alaska Waters Task Force*. Website: http://housemajority.org/coms/anw/pdfs/27/NWTF_Full_Report_Color.pdf.

[146] There are very small areas in which salmon fisheries occur in Federal waters. Under the Federal Fishery Management Plan, NMFS defers management in Federal waters to the State of Alaska, while retaining Federal oversight. The same management arrangement is in place for commercial crab fisheries in and off Alaska.

transferal quotas (ITQs) are distributed among individual qualifying fishermen, while others allocate TAC shares to a specific gear-group or operational mode (e.g., trawlers, Catcher/Processor vessels). These shares determine the quantity of fish the recipient or sector may harvest, by management area, for the year. Under some forms of these catch share programs, recipients may buy, lease, and sell these shares or operate cooperatively to optimize harvest of the allotted shares.

5.4.4.2 State Fisheries Harvest Information

Commercial harvest data in State fisheries are reported by ADF&G management area. Portions of the proposed Arctic ringed seal CH are located in the ADF&G Arctic-Yukon-Kuskokwim (A-Y-K) Management Region, which includes the coastal waters of the Bering, Chukchi, and Beaufort Seas, as well as the rivers and streams draining into these bodies of water. Within the A-Y-K Management Region there are four ADF&G fisheries management areas, two of which overlap with the proposed Arctic ringed seal CH: Norton Sound & Kotzebue Management Area and the Northern Management Area. ADF&G issues commercial fishing permits in these areas for salmon, crab, and herring.

The ADF&G management boundaries for State fisheries do not align well with the proposed CH boundaries. ADF&G management units include in-river commercial catch, as well as catch within the State-managed nearshore coastal waters (within the three-mile boundary). Much of the reported ADF&G commercial harvest is in-river catch, rather than catch from marine waters. However, the ADF&G also provides data specific to several of the nearshore areas (bays and sounds) within the proposed CH. As available, these harvest data specific to the proposed Arctic ringed seal CH are provided below.

The ADF&G fisheries harvest reports include species, pounds landed, and ex-vessel value. Salmon harvest accounts for most of the commercial fishing within the A-Y-K Management Region, with most of this harvest occurring in-river. The value of commercial fish harvest in the A-Y-K, including in-river harvest, is small compared to total State harvest value. For example, the total ex-vessel gross value of the salmon harvest in this management unit was estimated to be $3,367,000 in 2012, accounting for about 0.67 percent of the total State-wide harvest gross ex-vessel value. Similarly, in 2012 the total ex-vessel value of the A-Y-K red king crab harvest was estimated to be $2,016,000, about 4.8 percent of the total State-wide harvest gross value. The A-Y-K halibut catch yielded roughly $11,460,000 (total ex-vessel value), about 7.8 percent of total State-wide harvest value. Finally, A-Y-K sablefish generated about $6,206,000 (total ex-vessel value), about four percent of the total State-wide harvest value. These harvest value statistics combine both in-river and nearshore fishing areas.

Norton Sound & Kotzebue Management Area

The Norton Sound & Kotzebue Management Area includes all waters from Point Romanof in Norton Sound to Point Hope in Kotzebue Sound, and St Lawrence Island. This region supports a population of around 17,000 persons, nearly all of whom depend to some degree on fish and game for their livelihood.[147] Chum and pink salmon are the predominant salmon species found in the Norton Sound and Kotzebue Sound areas, with smaller stocks in these areas of sockeye, coho, and Chinook. In 2012, the total ex-vessel value of chum salmon harvested in Kotzebue Sound (within proposed CH) was approximately $570,000, and in Norton Sound (within proposed CH) was approximately $760,000 (see **Tables 5-15 and 5-16**).

There is an important commercial king crab fishery in Norton Sound (within proposed CH) with ex-vessel gross value of approximately $2.0 million in 2012. Management of this king crab fishery has imposed limits on vessel size, and designated this fishery as a "super exclusive" fishery, which prohibits vessels registered for the Norton Sound king crab fishery from participating in any other king crab fishery in the same year.

[147] Alaska Department of Fish and Game. 2013. *Commercial Fisheries Overview: Norton Sound & Kotzebue Management Area*. Website: http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareanortonsound.main.

Table 5-15 2012 Commercial Harvest in Kotzebue Sound

Catch Statistic	Chum
Fish	227,965
Pounds	1,751,473
Ex-Vessel Value	$567,664

Source: 2012 Kotzebue Sound Salmon Season Summary. Alaska Department of Fish and Game Division of Commercial Fisheries. Nome, AK October 2012. http://www.adfg.alaska.gov/static/home/news/pdfs/newsreleases/cf/232517857.pdf

Table 5-16 2012 Commercial Harvest in Norton Sound

Catch Statistic	Sockeye	Coho	Pink	Chum	Crab
Fish	100	37,056	205,498	62,722	132,030
Pounds	NR	NR	NR	NR	373,990
Ex-Vessel Value	$1,001	$361,283	$175,011	$221,611	$2,016,000

Sources: *2012 Norton Sound Salmon Season Summary*. Alaska Department of Fish and Game Division of Commercial Fisheries. Nome, AK October 2012. http://www.adfg.alaska.gov/static/home/news/pdfs/newsreleases/cf/232684328.pdf

2011 Norton Sound Summer Crab Season Summary. Alaska Department of Fish and Game Division of Commercial Fisheries. Nome, AK May 2012. http://www.adfg.alaska.gov/static/home/news/pdfs/newsreleases/cf/128284333.pdf

Northern Management Area

The Northern Management Area includes all Alaskan waters north of the western tip of Point Hope, including waters draining into the Arctic Ocean and Chukchi Sea. Small populations of chum, pink, and Chinook salmon have been reported along the northern coast. There are no commercial fisheries for salmon species in the Northern Area.[148] Although not reported in ADF&G catch data, publications by ADF&G indicate that Arctic cisco and least cisco are commercially caught in this region, with such fishing generally occurring in October and November using set gillnets operated under the ice.[149]

5.4.4.3 Federal Fisheries Harvest Information

The southern portion of the Arctic ringed seal proposed CH overlaps with the northern portion of the Federal Bering Sea and Aleutian Island (BSAI) Management Area. Catch data from NMFS indicate that pollock, Pacific cod, flatfish, and halibut are commercially caught within the proposed Arctic ringed seal CH. As noted above, the IPHC sets the allocation limits for halibut harvest in and off Alaska, but NMFS manages and enforces commercial halibut harvest.

Groundfish is the largest Federal fishery off Alaska, with a gross ex-vessel value estimated at $991.6 million in 2011, of which $758.2 million, or 76 percent, was caught in the BSAI Management Area.[150] Total catch within the BSAI Management Area in 2011 was 1,818.3 metric tons (round weight), or 88 percent of the total 2,068.0 metric tons of groundfish commercially caught in 2011 off Alaska. **Table 5-17** shows the total catch weight and ex-vessel value for each Federally-managed groundfish species in the BSAI Management Area.

[148] Alaska Department of Fish and Game. Divisions of Sport Fish and Commercial Fisheries. 2012. *Annual Management Report Yukon and Northern Areas 2010, Fishery Management Report No. 12-23.* Website: http://www.adfg.alaska.gov/FedAidpdfs/FMR12-23.pdf.

[149] Alaska Department of Fish and Game. 2013. *Commercial Fisheries Overview: Northern Management Area*. Website: http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareanorthern.main.

[150] North Pacific Fisheries Management Council. November, 2012. *Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea / Aleutian Islands Area: Economic Status of the Groundfish Fisheries Off Alaska*, 2011, NPFMC Economic SAFE. Website: http://www.afsc.noaa.gov/REFM/Docs/2012/economic.pdf.

Table 5-17 2011 Bering Sea and Aleutian Islands Management Area Groundfish

Species	Total Catch (1,000 Metric Tons, round weight)	Ex vessel value ($ Millions)
Pollock	1200.5	$431.2
Sablefish	1.7	$18.2
Pacific Cod	220.2	$148.9
Flatfish	286.4	$105.1
Rockfish	28.2	$20.8
Atka Mackerel	51.8	$29.5
Total	1818.3	$758.2

Source: Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea / Aleutian Islands Area: Economic Status of the Groundfish Fisheries Off Alaska, 2011. NPFMC Economic SAFE. Seattle, WA. November 2012.

Table 5-18 summarizes 2011 data on the portion of BSAI groundfish, halibut, and sablefish commercial fishing activity within proposed CH. The table presents retained tonnage and value as well as the commercial fishing vessel activity (in terms of the number of distinct fishing vessels) within the proposed Arctic ringed seal CH. In 2011, commercial vessels harvested 49,379 round metric tons of groundfish from proposed CH waters, with total gross ex-vessel value of $20.5 million; this represents approximately five percent of the total ex-vessel value of the BSAI groundfish fishery. Pollock accounts for 84 percent of the gross ex-vessel value of groundfish commercially caught in this area. Halibut is also harvested within the proposed Arctic ringed seal CH; in 2011, four vessels operated in this area and harvested 362 metric tons of halibut, valued at $4.2 million.

Table 5-18 2011 Groundfish and Halibut Harvest within the Proposed Arctic Ringed Seal CH

Target Species	Round Metric Tons	Ex Vessel Value	Distinct Number of Fishing Vessels Operating in Proposed CH Waters
Groundfish			
Flatfish	10,219	$1,046,271	23
Pacific Cod	8,028	$6,173,306	21
Pollock	31,492	$13,271,612	16
Sablefish	*Confidential, Negligible value.*		
Groundfish Subtotal	49,739	$20,491,189	N/A[1]
Halibut	362[2]	$4,231,007	4
Total Within Proposed CH	50,101	$24,722,196	N/A[1]

Source: Lew is, Steve and Alexander Kotlarov. 2013. NMFS. Personal communication w ith Barbara Wyse, Cardno ENTRIX, April 15 and April 30. Halibut harvest data are from the NMFS, Restricted Access Management Individual Fishing Quota catch database. Groundfish harvest data are from the NMFS, Catch in Areas Database.

1. The same vessel may target multiple species, so the total distinct number of vessels operating in the groundfishery may not be additive.

2. Net tons, after heading and gutting.

Figure 5-12 shows the tonnage of catch by species within the proposed CH for 2008 through 2011. With continued sea ice diminishment and the potential for commercially important fish species to move into more northern waters, interest in commercial fisheries north of the Bering Strait has increased.[151] However, the figure indicates that within the last five years there has not yet been a clear trend of increasing fishing activity within the proposed CH.

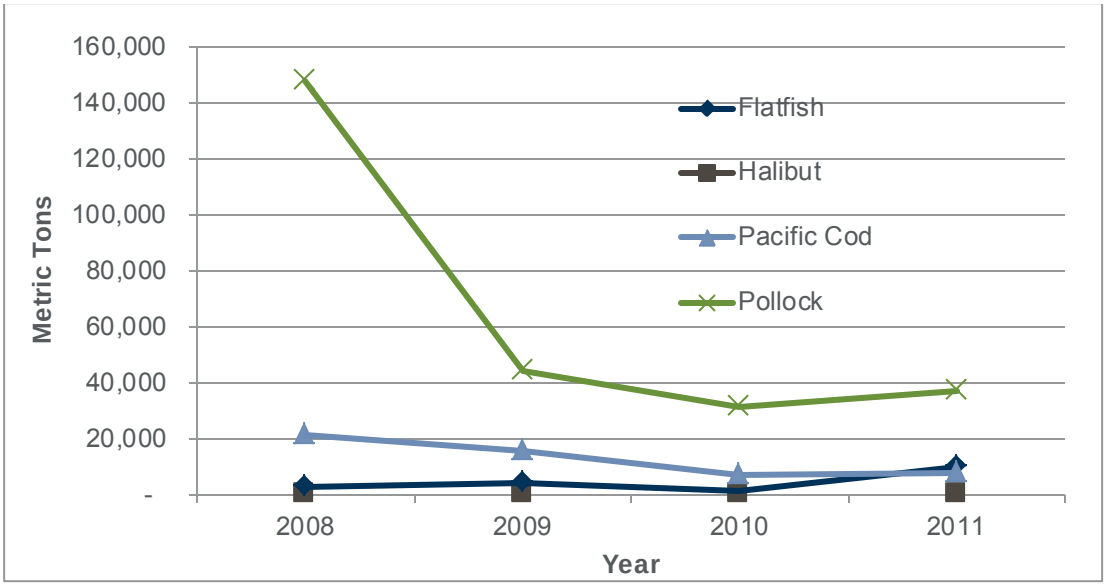

Figure 5-12 Groundfish Catch (Metric Tons) by Year within the Proposed Arctic Ringed Seal CH

5.4.5 Alaska Native Subsistence Use and Personal Use

Subsistence hunting and fishing activities within the proposed Arctic ringed seal CH are very important to the culture and local economies of Northern Alaska coastal villages and communities. Alaskan residents with 12 consecutive months of residency, both Alaska Natives and non-Natives, may participate in subsistence fisheries and subsistence hunts (except for marine mammals, of which subsistence use is limited to Alaska Natives who live on the coast of the North Pacific or Arctic oceans.) Many residents who work full- or part-time for wages continue to hunt and fish for much of their food. Within the proposed CH, marine resources are integral to a majority of the communities' traditions and culture, including those of communities that lie inland. This section covers the traditional and current uses of Arctic ringed seals and other species in the proposed CH by indigenous people and others for purposes of personal consumption and for customary and traditional uses.

As discussed in **Section 5.2** (Description of Affected Economies), the coastal population adjacent to the proposed CH is predominantly Alaska Native. This section, thus, primarily focuses on the Native population and their subsistence use.

Identifying Federal Nexus

Subsistence hunting and fishing in Alaska by Alaska residents are regulated by the State and the Federal government, with management responsibility depending upon where the harvests occur. This is a "dual management system" because of overlapping State-Federal jurisdictions in many areas. In general, the State of Alaska regulates subsistence fishing and hunting on all State of Alaska lands and waters while

[151] Alaska State Legislature. Northern Waters Task Force. 2012. *Findings and Recommendations of the Northern Alaska Waters Task Force*. Website: http://housemajority.org/coms/anw/pdfs/27/NWTF_Full_Report_Color.pdf.

the Federal government regulates these activities on Federal public lands and Federally-reserved waters in Alaska.[152]

State and Federal laws define subsistence uses as the "customary and traditional uses" of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing, and customary trade.[153] State and Federal programs recognize "traditional and cultural use" as a unique element of subsistence use. Subsistence guidelines for both State and Federal programs restrict subsistence uses last, only after restricting other uses, such as sport or commercial. Federal and State subsistence programs are operated in a coordinated fashion in accordance with a Memorandum of Understanding between the Federal Subsistence Board and the State of Alaska.

Federal jurisdiction over subsistence programs stem from the Alaska National Interest Lands Conservation Act (ANILCA) and the MMPA. ANILCA provides rural Alaskans priority access to traditional and customary uses of wild renewable resources. In order to administer the ANILCA subsistence on Federal public lands and waters, the Secretaries of the Interior and Agriculture established the Federal Subsistence Management Program. The program provides for public participation through the Federal Subsistence Board and 10 regional advisory councils. The Federal Subsistence Board is the decision-making body that oversees the program. The program provides opportunities for a subsistence way of life by rural Alaskans on Federal public lands and waters, while maintaining healthy populations of fish and wildlife.[154]

The Fisheries Resource Monitoring Program was established to help provide information for management of subsistence fisheries on Federal public lands in Alaska. The Monitoring Program funds projects that address research priorities identified by management agencies and local users. The Division of Commercial Fisheries, ADF&G, handles the management of subsistence fisheries in the State of Alaska in conjunction with the Federal government.

Section 101(b) of the MMPA provides an exemption from its take prohibitions that allows Alaska Natives to harvest marine mammals for subsistence use for traditional Native handicraft purposes, provided that the taking is not done in a wasteful manner. Alaska Native subsistence hunting of species listed as threatened and endangered is also exempted under section 10(e) of ESA, which allows for taking of listed species if it is primarily for subsistence purposes, so long as it is not done in a wasteful manner. Designation of CH will not affect the continued subsistence harvest of Arctic ringed seals, nor the harvest of other subsistence species and resources found within the proposed CH.

NMFS is the primary Federal agency responsible for research, management, and conservation of ice seals.[155] NMFS, along with the Ice Seal Committee (ISC), co-manages ice seals by monitoring harvest and cooperating on needed research and education programs pertaining to these seals. The ISC is an Alaska Native organization devoted to conserving ice seal populations, habitat, and hunting, along with preserving Native cultures and traditions.[156]

Native Peoples Subsistence and Cultural Use

As discussed in Section 5.2.3, the proposed Arctic ringed seal CH is adjacent to land owned and managed by four Alaska Native Claims Settlement Act (ANCSA) Regional Corporations and some of their related Village Corporations. These ANCSA Regional Corporations include: the ASRC, NANA Regional

[152] Alaska Department of Fish and Game. Division of Subsistence. 2010. *Subsistence in Alaska: A Year 2010 Update.*

[153] Ibid

[154] Federal Subsistence Management Program. Website: http://alaska.fws.gov/asm/about.cfml. Accessed February, 2013.

[155] National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2013. *Ice Seals: Frequently Asked Questions*. Website: http://alaskafisheries.noaa.gov/protectedresources/seals/ice.htm. Accessed February 6, 2013.

[156] Ibid.

Corporation, the BSNC, and the Calista Regional Corporation. Villages in the region balance their economies between subsistence hunting and fishing, and wage employment.

Reliance on subsistence harvests in the ASRC region is evident in data for Kaktovik, a community on the Beaufort Sea coast. In 1998, subsistence resources made up at least half of the food consumed in 83 percent of the households in Kaktovik, although this decreased to 69 percent by 2003.[157] Inland villages, such as Anaktuvuk Pass and Atqasuk in the North Slope Borough, do not rely as heavily on marine resources as other villages on the North Slope but marine resources are still integral to the community's traditions and culture. Shares of marine resources are commonly brought into inland communities from coastal villages and this occurs with Anaktuvuk Pass and Atgasuk.

Within the NANA region, which falls within the State of Alaska's Kotzebue Sound Management Area for subsistence fishing, there are comprehensive subsistence harvest studies available for seven of the eleven Kotzebue Sound communities. Over the last ten years, the top ten species of fish and wildlife harvested in these seven communities were: caribou, sheefish, chum salmon, bearded seal ("ugruk"), whitefishes, moose, Dolly Varden ("char"), Arctic ringed seal, berries, and beluga ("white") whale. Arctic ringed seals represent 3 percent of the total subsistence harvest by weight.[158]

The BSNC lies within the State of Alaska's Norton Sound-Port Clarence Management Area for subsistence fishing. Subsistence hunting in the area includes harvesting walrus, polar bear, and seals, including Arctic ringed seals. A comprehensive subsistence survey conducted in the Bering Straits Region by Kawerak, Inc.[159], estimated that two-thirds of the respondents living in the Norton Sound-Port Clarence Management area consumed wild foods at least three days a week; and 20 percent consumed wild foods six or seven days a week.[160]

The Calista Regional Corporation has the largest total population out of the four Regional Corporations within the proposed CH. Only a small portion of the Calista Regional Corporation overlaps with the proposed CH. Emmonak is the largest village within Calista located adjacent to the proposed CH. In 2008, subsistence use in Emmonak is widespread, with 510 usable pounds of wild resources harvested per capita.[161] Wild resources include wild plants, shellfish, birds, eggs, marine mammals, land mammals, salmon, and other fish. Approximately 16 percent of this harvest was of marine mammals, while fish and shellfish accounted for approximately 54 percent of harvest.

Traditional and Current Arctic Ringed Seal Harvest Practices

As noted earlier, subsistence hunting of Arctic ringed seals by Native peoples residing on the coast is exempt under section 10(e) of the ESA and section 101(b) of the MMPA. Designation of CH will not prohibit or limit subsistence hunting of Arctic ringed seals.[162] Arctic ringed seals are predominately

[157] Alaska Department of Natural Resources. Division of Oil and Gas. 2008. *North Slope Foothills Areawide Final Best Interest Finding*, "Chapter 5: Current and Projected Uses in the North Slope Foothills Area. Website: http://dog.dnr.alaska.gov/Leasing/Documents%5CBIF%5CNorth_Slope_Foothills%5CChapter5_CurrentProjectedUses.pdf. Accessed 2013.

[158] Alaska Department of Fish and Game. *Subsistence Fishing, Information by Area, Kotzebue Sound Management Area.* Website:http://www.adfg.alaska.gov/index.cfm?adfg=ByAreaSubsistenceKotzSound.main. Accessed 2013.

[159] After the passage of the Alaska Native Claims Settlement Act in 1971, Bering Straits Native Association organized Kawerak as the regional non-profit corporation (incorporated under State Law in 1973) to provide services throughout the Bering Straits Region.

[160] Alaska Department of Fish and Game. *Subsistence Fishing, Information by Area, Kotzebue Sound Management Area.* Website:http://www.adfg.alaska.gov/index.cfm?adfg=ByAreaSubsistenceKotzSound.main. Accessed 2013.

[161] Fall, James. 2011. Continuity and Change in Subsistence Harvests in Three Bering Sea Communities: Akutan, Emmonak, and Togiak. Presented at the Fishing People of the North Symposium, Anchorage Alaska, September 16. Website: http://seagrant.uaf.edu/conferences/2011/wakefield-people/presentations/fall-akutan-emmonak-togiak.pdf.

[162] National Oceanic and Atmospheric Administration, National Marine Fisheries Service. June, 2008. Letter to Ice Seal Committee.

hunted by coastal Alaska Natives from Bristol Bay to Kaktovik for human consumption (meat and seal oil) and for pelts to make clothing, rope, and handicrafts.

Sharing of subsistence resources, including Arctic ringed seals, is one of the most important traditions in Inupiat culture along the North Slope. Hunters share with community members and guests during community feasts or potlatches. For example, in the North Slope village of Nuiqusut, researchers found that all subsistence hunters shared part of their harvest at least once, and that 87 percent of the harvests resulted in sharing.[163]

ADF&G has in the past maintained a database that provided information on the subsistence harvest of Arctic ringed seals in different regions of Alaska. As of August 2000, this database indicated that the estimated number of Arctic ringed seals harvested for subsistence use each year was 9,567.[164] Because there are no more recent entries in this database and no other current efforts to quantify the statewide harvest of Arctic ringed seals, this is the best estimate of annual subsistence harvest currently available.

Subsistence Fisheries

Of the estimated 43.7 million pounds of wild foods annually harvested in rural Alaska, subsistence fisheries contribute about 60 percent from finfish and 2 percent from shellfish.[165] The ADF&G Division of Commercial Fisheries manages the state subsistence fisheries, with the exception of fisheries on all Federal public lands and waters that are under federal management.

Under State of Alaska subsistence fishing regulations, finfish may be taken for subsistence purposes at any time in any area of the state, with the exception of salmon, rainbow trout, and steelhead trout, which have seasonal limitations[166, 167] Finfish species taken for subsistence purposes in waters within or adjacent to the proposed CH include salmon, herring, sheefish, whitefish (i.e., species of cisco and "broad" and "humpback" whitefish), Arctic char/Dolly Varden (locally called "trout"), saffron cod, capelin, rainbow smelt, northern pike, starry flounder, yellow fin sole, Arctic flounder, Alaska plaice, Arctic grayling, burbot, and halibut.[168] Some subsistence fisheries within the proposed CH require a permit issued by the ADF&G. These fisheries are primarily salmon, halibut, shrimp, and crab.

Salmon and herring are the most important fisheries in the A-Y-K region. In addition, white fish are important to residents in this region and extensive monitoring of non-salmon species has been done in the Kotzebue Sound, Norton-Sound-Port Clarence, Yukon, and Kuskokwim Management areas by the ADF&G.

The most recent household surveys of subsistence harvest of fish in the Kotzebue region were conducted in 2004, in six Kobuk River communities: Ambler, Kiana, Kobuk, Noatak, Noorvik, and Shungnak. The surveys indicated that an estimated 26,181 salmon, 10,835 sheefish, 50,501 whitefish, and 11,697 char (Dolly Varden) were harvested for subsistence.[169]

Shellfish, particularly crab, are also used for subsistence purposes in areas within the proposed CH. The main subsistence fishery within proposed CH that requires an ADF&G permit for participation is the

[163] Alaska Department of Natural Resources. Division of Oil and Gas, Leasing. Website: http://dog.dnr.alaska.gov/Leasing/Documents%5CBIF%5CNorth_Slope_Foothills%5CChapter5_CurrentProjectedUses.pdf.

[164] Allen, B.M., and R.P Angliss. 2012. *Alaska Marine Mammal Stock Assessments, 2011.* U.S. Department of Commerce Technical Memorandum NMFS-AFSC-234. Website: http://w ww.nmfs.noaa.gov/pr/sars/region.htm.

[165] Fall, James A., et al. 2009. *Alaska Subsistence Salmon Fisheries 2007 Annual Report.* Alaska Department of Fish and Game. Technical Paper No. 346.

[166] 5 AAC 01.005.

[167] 5 AAC 01.180.

[168] Menard, Jim, Joyce Soong, and Scott Kent. 2012. *2011 Annual Management Report Norton Sound, Port Clarence, and Kotzebue*. Alaska Department of Fish and Game. Fishery Management Report No. 12-39.

[169] Fall, James A., et al. 2007. *Alaska Subsistence Salmon Fisheries 2004 Annual Report.* Alaska Department of Fish and Game. Technical Paper No. 317.

Norton Sound Subsistence King Crab Fishery. The Norton Sound Subsistence King Crab Fishery has both a summer and winter harvest. Residents utilize the red king crab for subsistence mainly in the winter. During the 2010-2011 winter crab season, 148 permits were issued, and the 95 permit holders that actually fished harvested 6,640 crabs, resulting in an average of 70 crabs per fisherman.[170]

5.4.6 Recreation and Tourism

There are few recreation or tourism activities within the proposed CH boundaries due to the presence of ice and overall hazardous conditions in these Arctic waters. Even when the area is ice-free during warmer months, navigation can be treacherous due to powerful tidal currents and weather events. There are, however, several companies (including Heritage Expeditions, Zegrahm Expeditions, and Hapag-Lloyd) that offer tourist cruises during summer months through the proposed CH. Cruise offerings in expedition vessels include trips from Nome south along the Alaskan coastline, as well as trips in and out of Nome to Russian waters. Recently, cruise ships have been venturing farther north as well. Until recently, there was too much ice for cruise ships to navigate the Northwest Passage, but with sea ice receding there is greater opportunity for such voyages. For example, one tour company offers a voyage from Nome through the Northwest Passage along the Beaufort Sea coastline, continuing on to eventually reach Iceland.[171] These cruises are marketed partly based on the opportunity to view marine mammal wildlife, including ice seals, polar bear, sea otter, Steller sea lions, walrus, whales, and dolphins. Bird-watching, particularly in the Bering Sea, is also a key attraction.[172] Tourism in the Arctic is expanding rapidly. In 2004, an estimated 1.2 million vessel passengers visited the Arctic; by 2007 this number had doubled.[173]

There are also tourism activities in coastal communities bordering proposed CH waters, particularly in Kotzebue, Nome, and Barrow. For example, Nome attracts visitors with its wildlife, scenery, and Native cultural history.[174] Visitors are also attracted to events in the area such as the Iditarod and the Midnight Sun Festival.[175] In Kotzebue, favorite recreational activities include hunting and fishing that peak during August and September.[176] Tour companies charter flights to visit these communities and offer tourists the opportunity to learn about native culture and life in the Arctic, as well as experience the natural wonders of the region, including wildlife. One key cultural attraction in Kotzebue is the Northwest Arctic Heritage Center, run by the National Park Service in conjunction with the Noatak National Preserve. The Noatak River "features some of the Arctic's finest arrays of plants and animals" and also provides world class float-trip opportunities from the Brooks Range to the Chukchi Sea.[177]

Tourists as well as residents participate in bird-watching and fishing in coastal and inland areas near these communities. Birders are drawn to the region in the spring, summer, and fall months to view migratory species,[178] while anglers fish in the region's rivers for such species as Arctic grayling, salmon,

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170 Menard, Jim, Joyce Soong, and Scott Kent. 2012. *2011 Annual Management Report Norton Sound, Port Clarence, and Kotzebue*. Alaska Department of Fish and Game. Fishery Management Report No. 12-39.

171 Hapag Lloyd Cruises. 2013. *Expedition Northwest Passage – Re-Discovered: a Legendary Sea Route*. Website: http://www.hl-cruises.com/finder/bre1314/.

172 Nome Convention and Visitors Bureau. Bearing Sea Cruises. Website: http://www.visitnomealaska.com/bering-sea-cruises.html.

173 Alaska State Legislature. Northern Waters Task Force. 2012. *Findings and Recommendations of the Northern Alaska Waters Task Force*. Website: http://housemajority.org/coms/anw/pdfs/27/NWTF_Full_Report_Color.pdf.

174 Personal communication with Richard Beneville, Nome Discovery Tours. March 25, 2013.

175 Nome Chamber of Commerce. Personal communication with Elizabeth Harrison, Staff Economist. Cardno ENTRIX. March 19, 2013.

176 Email response from the Katzebue Chamber of Commerce, March 27, 2013.

177 National Park Service. 2013. Noatak National Preserve. *Wilderness Adventure*. Website: http://www.nps.gov/noat/index.htm.

178 Hapag Lloyd Cruises. *Expedition Northwest Passage – Re-Discovered: a Legendary Sea Route*. Website: http://www.hl-cruises.com/finder/bre1314/.

Dolly Varden, Arctic char, least cisco, Northern Pike, burbot, and various types of whitefish.[179] Due to the short summer tourist season and relatively expensive cost (in the range of $700 to $800 for a one-day excursion from Anchorage),[180] tourism visits to these communities are fairly limited.

5.4.7 Commercial Shipping and Marine Transportation

Marine vessels transiting proposed Arctic ringed seal CH include oil and gas tankers, container ships, cargo ships, cruise ships, fishing vessels, research vessels, and icebreakers. Commercial shipping activity occurs mainly in the summer months when sea ice is at a minimum. **Figure 5-13** provides a comparative view of sea ice levels in the winter versus the summer months. Arctic vessel traffic is classified as destinational (vessels traveling within the region) or non-destinational (vessels using the Arctic area as a passageway between the Atlantic and Pacific Oceans using either the Northern Sea Route or the Northwest Passage). Destinational vessels include cargo ships and barges providing supplies to Arctic communities.

Most Arctic marine traffic is destinational, shipping supplies to the region and exporting minerals out of the region. Nearly all cruise ships passenger vessel traffic within proposed CH occurs in the ice-free waters in the summer season, mostly along the North American continent, south of the Bering Strait or within the Canadian Arctic Archipelago. However, cruise ship traffic north of the Bering Strait is also expanding. According to the USCG, in 2012, there were 480-plus vessel transits of the Bering Strait.[181] This is over a two-fold increase from 2008, when there were an estimated 220 transits of the Bering Strait.

The two major shipping routes with the proposed Arctic ringed seal CH are depicted in **Figure 5-14**. The Northwest Passage runs parallel to the Alaskan Coast cutting through the Bering Strait, then up through the Canadian Arctic Archipelago. The Northern Sea Route runs parallel to the Russian Coast through the Bering Strait and into the Bering Sea. Also shown on the map is the potential future Trans-Arctic Shipping Route, which may become a major shipping lane as sea ice in the Arctic becomes less prevalent.

Currently there is little activity by ice breakers and research vessels in the Arctic. Russian and Canadian icebreakers are used along the Northern Sea Route and within the Canadian Arctic Archipelago to clear shipping passageways. The U.S. currently does not engage in icebreaking activities for commercial or navigational purposes outside of emergency response activities carried out by the USCG.[182] There are no current U.S. or Alaska regulations on icebreaking activities. Such activities may increase with increases in shipping and marine transport in the area if an alternative trade route connecting the Atlantic and Pacific oceans becomes economically and operationally viable.[183] Numerous studies indicate that the Arctic Ocean is moving toward an ice-diminished condition, particularly a reduction of thick, unmoving, multi-year ice, resulting in greater maritime access to and through the region, longer navigable seasons, and generally less difficult ice conditions for marine operations. While the expected ice would be less

[179] Alaska Department of Fish and Game. 2006. *Nome Roadside Fishing Guide.* Website: http://www.adfg.alaska.gov/static-sf/Region3/PDFs/nome07.pdf.

[180] Northern Alaska Tour Company. 2013. *Barrow Adventures and Expeditions.* Website: http://www.northernalaska.com/barrow.cfm.
Northern Alaska Tour Company. *Kotzebue Adventures*. Website: http://www.northernalaska.com/nome.cfm.

[181] US Coast Guard. February, 2013. USCG Seventeenth District. *Nome Maritime Symposium*. Website: http://seagrant.uaf.edu/conferences/2013/bering-strait-maritime/presentations/houck-cg-overview-traffic-spill-response-web.pdf.

[182] United States Coast Guard. 2013. Committee on the Assessment of U.S. Coast Guard Polar Icebreaker Roles and Future Needs, *Polar Icebreakers in a Changing World*. Website: http://www.nap.edu/openbook.php?record_id=11753. Accessed February 15, 2013.

[183] U.S. Coast Guard. 2012. USCGC Polar Star (WAGB-10), January. Website: http://www.uscg.mil/pacarea/cgcpolarstar/default.asp. Accessed February 5, 2013.

thick than the multi-year ice, increased ice mobility may increase hazards for ships operating in the region.[184]

There is potential for highly increased shipping activity if changes in sea ice patterns open new shipping lanes and allow for a longer navigable season. Increased marine traffic directly over the pole is possible via the theoretical Trans-Arctic Shipping Route shown in **Figure 5-14**. A number of future polar shipping scenarios are presented in the 2009 Arctic Marine Shipping Assessment (AMSA), including the "Arctic Race" and "Arctic Saga" scenarios. In both scenarios there is high demand for trade and Arctic resources. However, in an "Arctic Race" scenario this demand results in ad-hoc, un-mitigated rush for Arctic wealth and resources, while in an "Arctic Saga" scenario there is a healthy rate of development, including rules-based concern for preservation of Arctic ecosystems and culture. A "Polar Lows" scenario results from low demand and unstable governance, with an under-developed future for the Arctic. A "Polar Preserve" scenario results from low demand for resource and trade, but with stable governance and slow development in the region with an extensive eco-preserve program and stringent "no-shipping zones."[185]

Major uncertainties identified by AMSA for these scenarios include the legal climate, global trade dynamics, rate of sea ice change, safety of new routes, oil prices, global agreements on construction rules and standards, shipping technology, escalation of maritime disputes, shift to nuclear energy, new resource discoveries, potential loss of the Suez or Panama canals, and the maritime insurance industry engagement, among others.[186] The 2009 AMSA makes the following predictions:

> Bering Strait will become a chokepoint for marine traffic in and out of the Arctic Ocean from the Pacific Ocean,

> New Arctic resource discoveries are highly probably and most new explorations and developments will require marine transport and increased operational support,

> Longer seasons of navigation will have significant implications for multiple uses in regional Arctic waterways, and

> New Arctic ship technologies will set a norm for more independently operated, icebreaking commercial ships.[187]

AMSA notes that there are few aids to navigation in the U.S. Arctic and no vessel routing measures in the Bering Strait. In response to the potential for increased vessel traffic in U.S. Arctic waters in the future, the USCG conducted a Port Access Route Study (PARS) to evaluate the need for new vessel routing measures in the Bering Strait.[188] Potential vessel routing measures in the Bering Strait, which would be expected to increase safety and efficiency of shipping through increased predictability of vessel traffic, include recommended routes, a traffic separation scheme (a routing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes), areas to be avoided, and precautionary areas.[189] A primary purpose of all PARSs is to 'reconcile the need for safe

[184] U.S. Coast Guard. 2010. High Latitude Region Mission Analysis Capstone Summary, July. Website: http://assets.fiercemarkets.com/public/sites/govit/hlssummarycapstone.pdf. Accessed February 15, 2013.

[185] Brigham, Lawson. 2009. *Outcomes of the Arctic Council's Arctic Marine Shipping Assessment (AMSA)*. Alaska Center for Climate Assessment and Policy (ACCAP). University of Alaska, Fairbanks, June 24. Website: http://ine.uaf.edu/accap/documents/2009_6_AMSA_Brigham.pdf. Accessed February 15, 2013.

[186] AMSA. 2009. *Scenarios, Futures and Regional Futures to 2020. Executive Summary with Recommendations*. Website: http://ine.uaf.edu/accap/documents/AMSAScenariosandRegionalFutures.pdf. Accessed February 15, 2013.

[187] Ibid

[188] United States Coast Guard, 2010, Port Access Route Study: In the Bering Strait, 33 CFR Part 167, online: https://www.federalregister.gov/articles/2010/11/08/2010-28115/port-access-route-study-in-the-bering-strait#h-13, accessed 2013.

[189] United States Coast Guard. 2010. *Bering Strait Port Access Route Study*. Website: http://www.arcus.org/files/meetings/279/276/presentations/wed10301410seris.pdf. Accessed 2013.

access routes with other reasonable waterway uses, such as renewable energy sites.'[190] Recommendations from the Bering Strait PARS may lead to future rulemaking action or international agreements.[191]

[190] United States Coast Guard. 2011. Port-Access Route Studies. Website: http://www.uscg.mil/hq/cg5/cg553/NAVStandards/PARS.asp. Accessed 2013.

[191] United States Coast Guard. 2011. Port-Access Route Studies. Website: http://www.uscg.mil/hq/cg5/cg553/NAVStandards/PARS.asp. Accessed 2013.

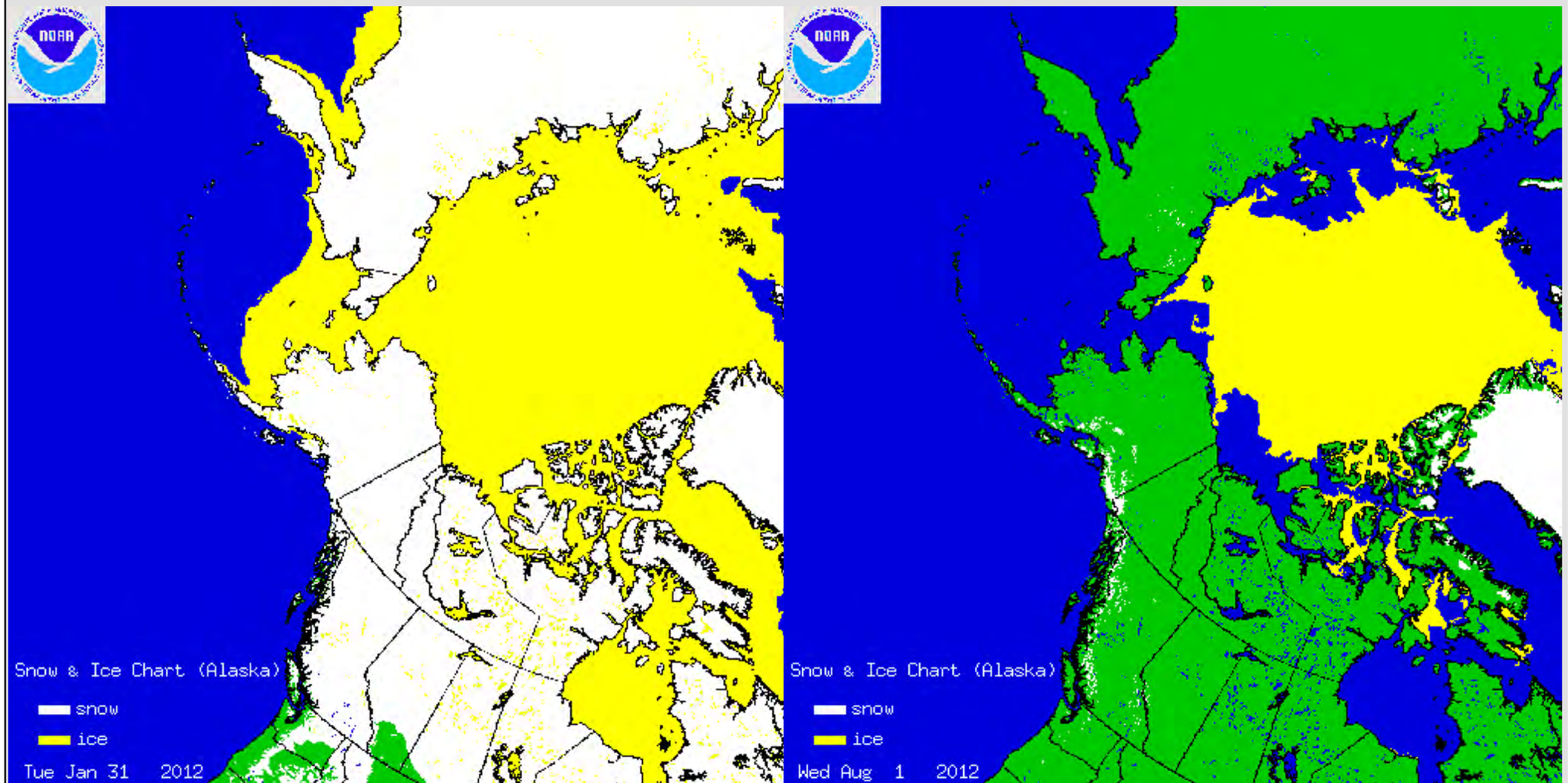

Figure 5-13

Sea Ice Extent in Winter Versus Summer Seasons

N

Data Source: National Snow and Ice Data Center
http://nsidc.org

Cardno ENTRIX

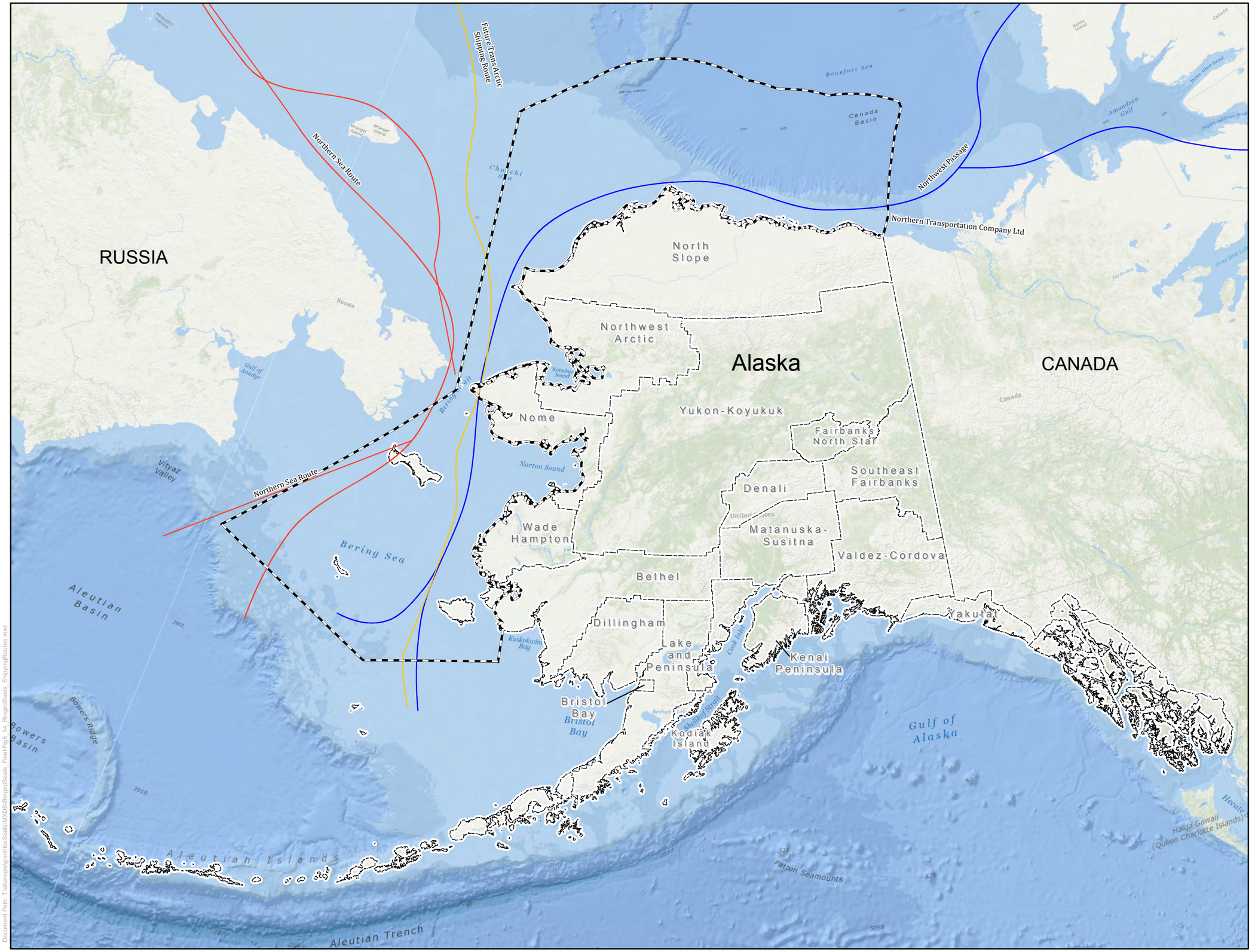

Figure 5-14

Major Marine Transportation Routes Overlapping Proposed Arctic Ringed Seal Critical Habitat

Legend

- Proposed Ringed Seal Critical Habitat
- County Boundary (Boroughs)

Shipping Route

- Future Trans Arctic Shipping Route
- Northern Sea Route
- Northwest Passage

0 50 100 200 300
Miles

N

Data Sources: Arctic Marine Shipping Assessment 2009 Report, Arctic Council, April 2009

*** Routes Generalized for Cartographic Purposes**

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Document Path: T:\shargie\gis\IceSeals\MXDS\RingedSeals_Final\Fig5_14_RingedSeals_ShippingRoutes.mxd

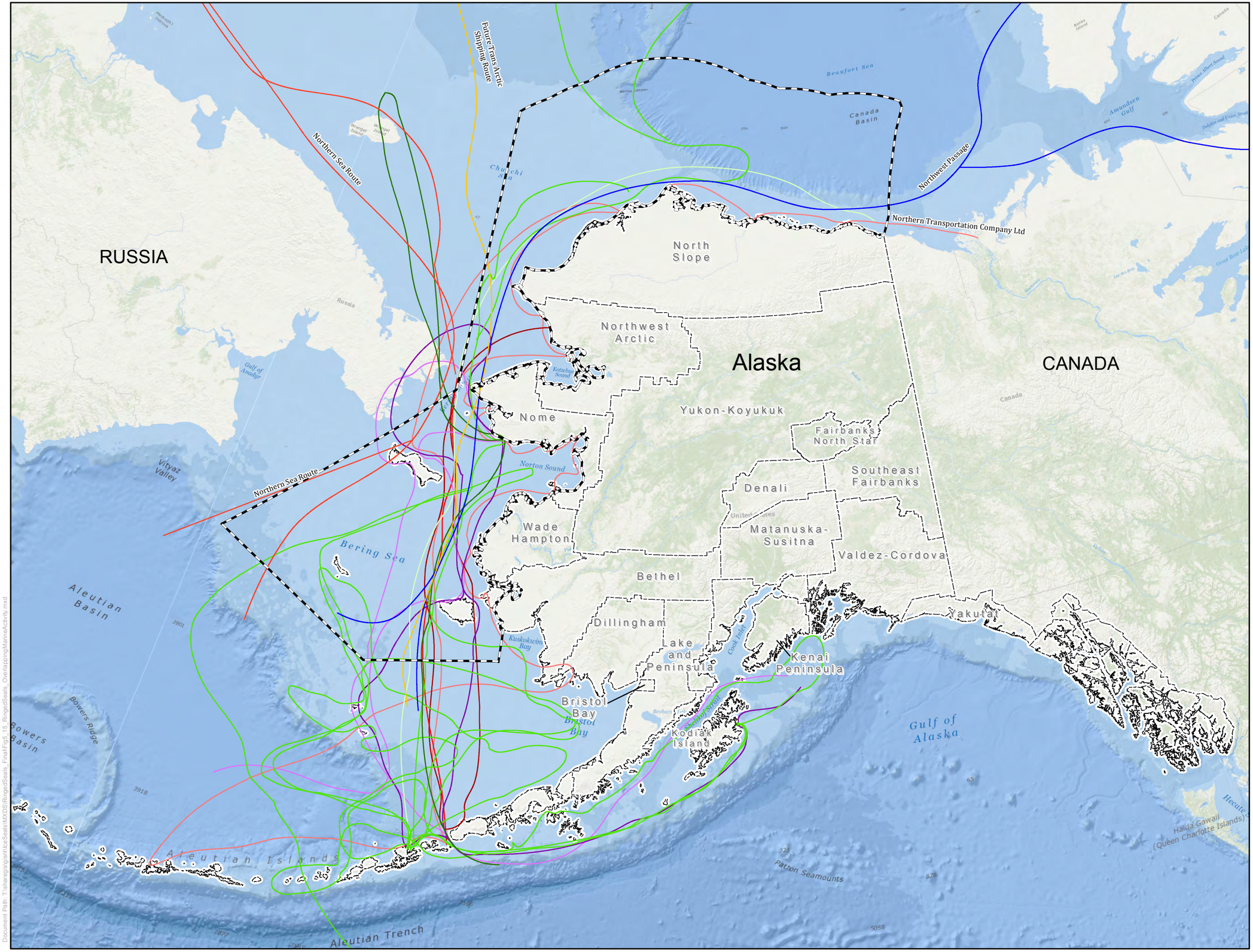

Figure 5-15

Marine Transportation Activity in 2004 Overlapping Proposed Arctic Ringed Seal Critical Habitat

Legend

- Proposed Ringed Seal Critical Habitat
- County Boundary (Boroughs)

Governmental Marine Activity

- Russian-American Long-term Census of the Arctic
- US Coast Guard (Miller Freeman, Fishing Ground Patrol Routes, Healy Arctic West)
- Canadian Coast Guard

Shipping

- Red Dog Mine Load Transfer Route
- Unimak Pass and the Bering Sea to Prudhoe Bay in the Beaufort Sea and return
- Northern Transportation Company Ltd (NTCL)
- Coastal Village Resupply

Cruises / Expeditions

- Bering Sea Cruises
- Bering Sea Society Cruises Expeditions

0 50 100 200 300
Miles

N

Data Sources: Adapted from Arctic Marine Shipping Assessment 2009 Report, Arctic Council, April 2009
*** Routes Generalized for Cartographic Purposes**

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5.4.8 Military Activities

Alaska is home to a number of military operations, including those of the U.S. Air Force, USCG, and U.S. Navy, that conduct operations within the proposed Arctic ringed seal CH. These Arctic operations are conducted in the context of the security interests in the region, including missile defense and early-warning systems, deployment of sea vessels and air craft for strategic deterrence, maritime presence, security operations, and navigation support.[192] Military activity in the Arctic has increased in recent years[193] due to growing commercial importance, international competition, and possible strategic challenges. Activities within the proposed Arctic ringed seal CH include military vessel traffic (marine, submarine, and aircraft), sonar, radar, icebreaking, and training exercises.[194]

This section summarizes the types and, where possible, locations of military activities within the proposed Arctic ringed seal CH.

5.4.8.1 Air Force

The U.S. Air Force has several facilities and conducts activities along the coasts of the Beaufort and Chukchi Seas. The Distant Early Warning Radar Line, a system of 63 radar stations constructed between 1954 and 1957, was decommissioned during the 1990s. However, the Barter Island and Bullen Point radar sites on the Beaufort Sea coast remain active and radar operations, aircraft, and barge traffic are ongoing.[195] Air Force activities within the proposed CH include military aircraft training exercises, aircraft traffic over open water, and radar surveillance of Arctic airspace.

5.4.8.2 Coast Guard and Navy

The U.S. Navy's primary mission in the Arctic is to maintain, train, equip, and operate combat-ready naval forces capable of "accomplishing American strategic objectives, deterring maritime aggression, and assuring freedom of navigation in ocean areas".[196] Naval operations in the Arctic are primarily limited to submarine operations conducted at various locations within Arctic waters. Submarine activity includes vessel traffic and sonar activity. These activities are ongoing and expected to continue in the future.[197]

USCG operations and activities within proposed Arctic ringed seal CH are primarily responsive actions to safety, environmental, or national security threats, including those related to search and rescue, ice patrolling, homeland security response, pollution incident investigation and response, and monitoring of tanker and shipping transit. Currently, the USCG has very limited Arctic emergency response capabilities to support its mission in the Arctic, and no permanent bases on the ANS. In response to increased Arctic vessel traffic, in July of 2012 the USCG established a summer Arctic base in Barrow (active through October).[198] This base enables the USCG to better respond and assist mariners in distress in areas off of the north coast of Alaska during the ice-free summer months. In the summer of 2012, two Jayhawk

192 Carafano, James Jay Ph.D. Ariel Cohen, Ph.D., Sally McNamara and Richard Weitz, Ph.D. 2011. EUCOM Should Lead U.S. Combatant Commands in Defense of National Interests in the Arctic, March 28. *The Heritage Foundation*. Website: http://thf_media.s3.amazonaws.com/2011/pdf/bg2536.pdf. Accessed February 14, 2013.

193 National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2011. *Effects of Oil and Gas Activities in the Arctic Ocean Draft EIS.* Website: http://www.nmfs.noaa.gov/pr/pdfs/permits/arctic_deis_volume2.pdf. Accessed February 15, 2013.

194 Ibid

195 Ibid.

196 Department of the Navy. 2012. Chief of Naval Operations. *ROD for SURTASSLFA Sonar*, August. Website: http://www.surtass-lfa-eis.com/docs/ROD_Final_LFA_15Aug12.pdf. Accessed February 14, 2013.

197 National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2011. *Effects of Oil and Gas Activities in the Arctic Ocean Draft EIS.* Website: http://www.nmfs.noaa.gov/pr/pdfs/permits/arctic_deis_volume2.pdf. Accessed February 15, 2013.

198 Alaska Dispatch. 2012. *Coast Guard boosts Arctic presence with summer base in Barrow*, July. Website: http://www.alaskadispatch.com/article/coast-guard-boosts-arctic-presence-summer-base-barrow.

helicopters and 30 USCG staff were based in Barrow. The recommendations by the Alaska State Legislature's Alaskan Northern Waters Task Force include establishment of a permanent Arctic base, and funding of icebreakers and other ice-capable vessels.

The USCG also occasionally conducts ice breaking activities in the Arctic. The USCG Cutter *Healy*, based in Seattle, is the U.S.'s only active polar icebreaker (ice breakers *Polar Sea* and *Polar Star* are not currently active*)*.[199] Demand for icebreaking activity in the Arctic is limited but expected to increase as future needs arise.[200] The *Healy,* which entered service in 2000, has only medium icebreaking capability and is used primarily to support scientific research. Funding has been requested by the USCG in its FY2013 budget to replace a reactivated *Polar Star* within 7 to 10 years[201].

Due to its currently limited icebreaking abilities, the USCG may seek assistance from polar icebreakers operated either commercially or by other countries. With potential increases in commercial activity in the Arctic region due to climate change, the demand for USCG regulatory and support services would likely also increase. Major drivers for future activity are oil and gas exploration and recovery, as well as split response; and increased shipping between the Atlantic and Pacific oceans (on potential new shipping routes made feasible by reduced sea ice) and within the Arctic Basin.[202]

For the USCG to continue to meet its mission objectives, USCG operation of polar icebreakers is likely going to become essential. Thus, reduced sea ice associated with global warming is likely to actually increase the frequency and geographic range of ice breaking activities.

As established by the Ports and Waterways Safety Act, the USCG is responsible for "designation of fairways and traffic separation schemes to provide safe access routes for vessels proceeding to and from ports.[203] In fulfilling this responsibility, as noted above in **Section 5.4.7**, the USCG is proposing new vessel routing measures in the Bering Strait that are aimed at increasing vessel transit safety and reducing congestion.

Although potentially mitigated by vessel routing measures, increased shipping activity could lead to more oil spills in the waters of the proposed CH. Oil spill response is regulated by the OPA of 1990. OPA addresses the prevention, response, and payment of oil pollution incidents in navigable waters of the U.S. Alaska Statute 46.04 also requires the ADEC to develop a statewide response plan and individual response plans for ten geographic subareas spanning the state.[204] Federal, State, and local entity response to discharge of oil and other hazardous substances is governed by The Alaska Federal/State Preparedness Plan for Responding to Oil and Hazardous Substance Discharges/Releases (Unified Plan). The Unified Plan is reviewed annually and revised as necessary; the most recent revision was in 2010.[205]

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199 O'Rourke, Ronald. 2012. *Coast Guard Polar Icebreaker Modernization: Background and Issues for Congress.* Congressional Research Service, December 10. Website: http://www.fas.org/sgp/crs/weapons/RL34391.pdf. Accessed February 15, 2013.

200 National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2011. *Effects of Oil and Gas Activities in the Arctic Ocean Draft EIS.* Website: http://www.nmfs.noaa.gov/pr/pdfs/permits/arctic_deis_volume2.pdf. Accessed February 15, 2013.

201 O'Rourke, Ronald. 2012. *Coast Guard Polar Icebreaker Modernization: Background and Issues for Congress.* Congressional Research Service, December 10. Website: http://www.fas.org/sgp/crs/weapons/RL34391.pdf. Accessed February 15, 2013.

202 U.S. Coast Guard. 2010. *High Latitude Region Mission Analysis Capstone Summary.* July 2010. Website: http://assets.fiercemarkets.com/public/sites/govit/hlssummarycapstone.pdf. Accessed February 15, 2013.

203 P.L 95-474; 33 U.S.C. 1223

204 U.S. Coast Guard. 2012. *Oil Pollution Act of 1990*, July 11. Website: http://www.uscg.mil/NPFC/About_NPFC/opa.asp#overview . Accessed February 15, 2013.

205 Alaska Department of Environmental Conservation. 2010. *Spill Prevention and Response, Alaska Federal/State Preparedness Plan for Response to Oil & Hazardous Substance Discharges/Releases (Unified Plan)*. Website: http://dec.alaska.gov/spar/perp/plans/uc.htm.

5.4.9 Interactions between Arctic Ringed Seal Habitats and other Protected Species and their Habitats

The proposed Arctic ringed seal CH also contains habitat that supports a number of other Federally protected species. Habitat protections for these other species benefits the Arctic ringed seal, while the protection of Arctic ringed seal CH will provide some protection to these other species. The ESA-listed species that occur within the proposed Arctic ringed seal CH include polar bear, spectacled eider, Steller's eider, bowhead whale, fin whale, humpback whale, North Pacific right whale and Steller sea lion, . Designated CH exists within the proposed Arctic ringed seal CH boundaries for spectacled eider (Units 3 and 4, Norton Sound and Ledyard Bay, respectively).

5.4.10 Educational, Scientific, Non-Consumptive Use of Arctic Ringed Seal and its Habitat

This section discusses recent scientific and educational efforts associated with Arctic ringed seal habitat conservation. Such efforts are fairly limited, likely due to the fact that Arctic ringed seal habitat is located in a remote and challenging environment. As NMFS noted in the final rule to list the Arctic ringed seal, "recreational, scientific, and educational uses of ringed seals are minimal and are not expected to increase significantly in the foreseeable future".[206] However, a partnership of NMFS, the ISC (an Alaska Native Organization), and the ADF&G meets and discusses research and management related to ice seals.

5.4.10.1 State and Local Efforts

The ADF&G has been conducting research on the Arctic ringed seal since the 1960s.[207] State research projects, conducted in collaboration with NMFS and the ISC and in cooperation with local communities, include the following activities:

> Biosampling the subsistence harvest to monitor population health.
ADF&G is currently collecting tissues and measurements from harvested ringed seals in collaboration with 8 villages: Barrow, Point Hope, Shishmaref, Diomede, Nome, Gambell, Savoonga, and Hooper Bay. The biosampling work is funded by Congress, with funds administered through NMFS, the National Science Foundation, and the North Pacific Research Board.[208]

> Satellite telemetry to study movement and habitat use of Arctic ringed seals.
Satellite tracking efforts include the Hooper Bay Seal Tagging project and the Kotzebue Sound Seal Tracking project.[209]

> Harvest monitoring to document subsistence needs.
Currently participating communities are: Togiak, Twin Hills, Hooper Bay, Tununak,and Quinhagak.[210]

> Surveys of local knowledge.
Since 2000, ADF&G has conducted surveys on hunter preferences and local knowledge.

ADF&G also publishes educational materials on the Arctic ringed seal, including information on their biology, and their subsistence and cultural importance.[211]

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206 77 FR 76711

207 Alaska Department of Fish and Game. *Ringed Seal (Phoca hispida), Research*. Website: http://www.adfg.alaska.gov/index.cfm?adfg=ringedseal.research.

208 Alaska Department of Fish andGame. *Ice Seal Research: Biological Monitoring.* Website: http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.icesealbio.

209 Alaska Department of Fish andGame. *Ice Seal Research, Hooper Bay Seal Tagging Project.* Website: http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.hooperbaysealtracking.
Alaska Department of Fish andGame. *Ice Seal Research, Kotzebue Sound Seal Tagging Project*. Website: http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.kotzebuesealtracking.

210 Alaska Department of Fish and Game. *Ice Seal Research: Harvest Monitoring*. Website: http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.icesealmonitoring.

5.4.10.2 Federal Efforts

The Polar Ecosystems Program of NMFS's National Marine Mammal Laboratory conducts research and monitoring in the Arctic, sub-Arctic, and Antarctic marine ecosystems. Research focuses on the biology and behavior of several seals, including the Arctic ringed seal. The primary purpose of the program is to support management and assessment of marine mammal population status under the MMPA, and to better understand factors affecting marine mammal populations and their ecological roles in the Arctic.

5.5 Summary and Future Actions to Protect Arctic Ringed Seal Habitat

Table 5-19 presents a summary of the activities discussed in **Section 5.4**, including for each respective activity, its status and location within the Arctic ringed seal's proposed CH, and aspects that may affect the proposed Arctic ringed seal CH. The table also presents the projected number of potential future Section 7 consultations by category of economic activity that may affect the proposed Arctic ringed seal CH, or a combination of the species and its habitat, over the next 10 years (2014 to 2023).

Because Arctic ringed seals were only recently listed, there have been only a few Section 7 consultations on the species. Other relevant sources of information, for example, the existing consultation history for other listed species that occur within the proposed Arctic ringed seal CH, were therefore considered by NMFS in estimating the number of future consultations for each category of activity. For example, to estimate the number of consultations associated with offshore oil and gas activities, NMFS considered the following two sources: the exploration activity "Level 3" described in the supplemental draft environmental impact statement prepared to analyze the effects of offshore oil and gas exploration activities in the U.S. Chukchi and Beaufort seas,[212] and the history of MMPA authorizations summarized in **Table 5-13**. Unless indicated otherwise in bold font, all consultations identified in **Table 5-19** would occur in connection with the jeopardy standard due to the listing of the species, and incremental costs would be limited to additional effort to address adverse modification in a new consultation. Consultations highlighted in bold font are those that would be initiated, or re-initiated, solely to address adverse modification.

[211] Alaska Department of Fish and Game. 2008. *Ringed Seal.* Website: http://www.adfg.alaska.gov/static/education/wns/ringed_seal.pdf.

[212] National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2013. *Effects of Oil and Gas Activities in the Arctic Ocean Supplemental Draft EIS.* Website: http://www.nmfs.noaa.gov/pr/permits/eis/arctic_sdeis.pdf

Table 5-19 Number of Potential Future Consultations by Category of Economic Activity that May Affect the Proposed Arctic Ringed Seal CH (or a Combination of the Species and its CH) Over the Next 10 Years

Economic & Social Activity	Status	Proposed Ringed Seal CH Area	Associated Effects that May Affect Proposed Ringed Seal CH	Future Section 7 Consultations and Potential Project Modifications
Oil and Gas				
Onshore Oil	Three producing units and four units in development located onshore with leases that include State waters of the Beaufort Sea (Beechey Point, Dewline, Qugruk, and Point Thomson). An informal consultation on Point Thomson was completed in 2012.	Adjacent to Beaufort Sea waters.	Wastewater, oil spills, and other discharges during development, construction, and commercial production. Noise from development, construction, and production activities and associated maritime and aircraft traffic. Ice road construction, maintenance, and vehicle traffic.	4 informal consultations over 10-year period for development activities. Action Agency: BLM, USACE
Offshore Oil, Beaufort and Chukchi seas	Beaufort Sea: Three producing units offshore in State waters. One producing unit in both State and Federal waters. One unit under development in Federal waters. One active exploration plan in Federal OCS region. All current production and development within Federal waters in the proposed CH boundaries is located in the Beaufort Sea. Exploration is also occurring in the Beaufort Sea. BOEM 5-year OCS oil and gas leasing program (expected every 5 years beginning in 2013). Chukchi Sea: No current production occurring. One	Beaufort Sea: All current production and development within the proposed CH boundaries is located in the Beaufort Sea; exploration is occurring in the Beaufort Sea. Chukchi Sea: Exploration plan in the Chukchi Sea.	Noise from seismic surveying, drilling, and production including associated maritime and aircraft traffic. Wastewater, oil spills, and other discharges during development, construction, and commercial production.	Deep-penetration and high-resolution surveys – 5 annually (one or both seas combined) for open-water and 1 annually for on-ice over 10-year period = 60 total formal consultations associated with IHAs. Exploratory drilling – 2 each sea annually over 10-year period = 40 total formal consultations associated with IHAs. OCS oil and gas leasing program - 1 formal consultation over 10-year period. BOEM authorization of the above surveys and

Economic & Social Activity	Status	Proposed Ringed Seal CH Area	Associated Effects that May Affect Proposed Ringed Seal CH	Future Section 7 Consultations and Potential Project Modifications
	active exploration plan in Federal OCS region. BOEM 5-year OCS oil and gas leasing program (expected every 5 years beginning in 2013).			exploratory drilling - 1 ***re-initiation of formal consultation due to CHD*** over 10-year period. Operation of offshore facility, associated issuance of ITRs and letters of authorization - 1 ***re-initiation of formal consultation due to CHD*** and 1 formal consultation over 10-year period Action Agency: NMFS, BOEM (others could include USACE, EPA, possibly Federal Energy Regulatory Commission for pipelines, but these may be co-action agencies under shared consultations)
	BLM Integrated Activity Plan for NPR-A. Final Integrated Activity Plan Record of Decision signed in Feb. 2013. For purposes of estimating impacts, an informal consultation on updates to this plan is assumed to occur within the 10-year analysis period.	Nearshore Beaufort Sea waters.	Wastewater, oil spills, and other discharges associated with oil and gas development.	NPR-A Integrated Activity Plan updates – 1 ***re-initiation of informal consultation due to CHD*** and 1 informal consultation over 10-year period. Action Agency: BLM

Economic & Social Activity	Status	Proposed Ringed Seal CH Area	Associated Effects that May Affect Proposed Ringed Seal CH	Future Section 7 Consultations and Potential Project Modifications
Natural Gas	No current commercial production. Potential development and distribution from the Chukchi and Beaufort Seas, only after a natural gas pipeline is built.	Beaufort Sea and Chukchi Sea and nearshore areas.	Noise from seismic surveying. Wastewater and other discharges during development, construction, and commercial production.	None anticipated over 10-year period.
Mining				
Nome Offshore Dredging	Recreational and commercial offshore suction dredging in State waters within the three mile boundary.	Norton Basin.	Noise, water quality impacts from suction dredging operations.	Commercial dredging- 1 informal consultation over 10-year period. Action Agency: USACE
Commercial Fisheries				
	Mostly State fisheries, although some Federal Fisheries and State-Federal parallel fisheries do occur (halibut and crab).	Commercial fishing present in Bering Sea portion of proposed CH.	Removal of ringed seal prey species.	Two formal consultations anticipated over 10-year period. Action Agency: NMFS

Economic & Social Activity	Status	Proposed Ringed Seal CH Area	Associated Effects that May Affect Proposed Ringed Seal CH	Future Section 7 Consultations and Potential Project Modifications
Commercial Marine Transportation				
	Vessels traversing CH waters during ice-free summer months include oil and gas tankers, cargo ships, research vessels, fishing vessels, and cruise ships. The number of marine vessels traversing CH is projected to increase with diminishing future sea ice.	Two major sea shipping lanes are currently utilized during ice free summer months (and, to a lesser extent, fall and spring months): Northwest Passage (runs along Alaska Coast through the Bering Strait up to the Canadian Arctic Archipelago), and Northern Sea Route (runs along the Russian Coat through the Bering Strait and into the Bering Sea) .	Oil spills, waste discharge, noise, and ice-breaking activities.	None anticipated over 10-year period.
Ports				
Nome Harbor	Annual maintenance dredging for 10-year time period.	Nome Harbor.	Noise and water quality impacts from dredging.	Maintenance dredging – 1 ***informal consultation resulting entirely from CHD*** over 10-year period. Action Agency: USACE

Economic & Social Activity	Status	Proposed Ringed Seal CH Area	Associated Effects that May Affect Proposed Ringed Seal CH	Future Section 7 Consultations and Potential Project Modifications
Subsistence				
	Subsistence hunting and fishing in CH and adjacent areas, primarily by Alaska Natives, includes caribou, moose, and numerous species of fish and shellfish. Subsistence hunting in CH by Alaska Natives also includes marine mammals, such as ringed and bearded seals. Subsistence hunting and fishing is managed by Federal and State entities; harvest of marine mammals is co-managed by Federal entities and Alaska Native organizations.	Coastal areas of the Bering, Chukchi, and Beaufort seas.	Removal of ringed seal prey species.	None anticipated over 10-year period. Subsistence harvest of ringed seals by Alaska Natives is provided for under both the ESA and the MMPA.
Military				
	Military training, safety, law enforcement, and icebreaking activities in CH involve vessel (marine, submarine) and aircraft traffic. These activities are expected to increase with diminishing future sea ice.	Bering, Chukchi, and Beaufort seas.	Oil spills, waste discharge, noise, explosive ordinance, and ice breaking.	Icebreaking associated with USCG activities – 1 formal consultation over 10-year period. Action Agency: USCG
	Unified Response Plan developed in 1994, last updated in 2010.	Bering, Chukchi, and Beaufort seas.	Response plan for oil and other hazardous substance discharges.	1 formal consultation over 10-year period. Action Agency: UCSG and EPA
	Bering Strait Port Access Study, 2010, recommended vessel routing measures for Bering Strait.	Bering Strait area.	Potential benefits to water quality. Transit rules may reduce ship accidents and hazardous substance discharges.	1 formal consultation over 10-year period on any formalized vessel routing measures. Action Agency: USCG

6 Costs and Benefits of Arctic Ringed Seal Critical Habitat Designation

This section provides a discussion of the expected costs and benefits of the proposed Arctic ringed seal CHD to the various sectors and projects outlined in **Section 5.4**. These expected costs and benefits primarily stem from Section 7 consultations,[213] which are summarized in the last column of **Table 5-19**. The expected costs of Section 7 consultations over the 10-year period of analysis are limited to administrative costs. Benefits of the proposed CHD may accrue, as outlined in **Section 4**, to a number of sectors and users, including commercial fisheries, subsistence users, recreation/tourism, education/scientific knowledge users, and those holding passive use value. All quantified costs and benefits summarized in this section are expressed in 2012 dollars.

NMFS projections of future consultations are based on the best available data on historical activity and permitting, planned projects, and projections of future activity within each sector. However, there is uncertainty regarding the number of future consultations. There is also uncertainty regarding whether a consultation will result in incremental project modifications due to CHD that would be above and beyond any such restrictions that would be imposed to avoid jeopardy to the species.

Although potential project modifications resulting from future consultations must be reviewed on a case-by-case basis, NMFS does not expect that CHD will result in incremental project modifications for activities occurring within the proposed CH over the next ten years (i.e., NMFS does not anticipate restrictions or modifications to activities additional to those that would be required under the jeopardy standard). The history of USFWS consultations on activities occurring within polar bear CH (prior to the vacature of the designation in January, 2013) supports this expectation. No consultations on activities within polar bear CH have resulted in project modifications that were additional to those required to protect the species.[214]

The proposed CHD may also result in indirect costs (such as those related to regulatory uncertainty, additional legislation triggered by CHD, or litigation as described in **Section 3.2**) to the sectors outlined in **Section 5.4**; these costs are not quantified due to significant uncertainty and information limitations, but they are acknowledged as possible, if not probable outcomes.

Section 4 of this report discusses the types of benefits than can be expected from, and a range of possible values associated with, the CHD. Though these estimates provide insight into the potential "types" and associated "values" of the benefits that may be generated from the CHD, they are specific to the activity, location, and point-in-time of the cited study. Thus, it is inappropriate to broadly apply these "specific" values to the proposed CHD. Therefore, only a brief qualitative discussion of the types of benefits expected from the proposed Arctic ringed seal CHD is provided below, as there is insufficient information currently available to derive "point estimate" monetized values for these benefits.

The Arctic region is undergoing habitat alteration due to climate change. As sea ice cover diminishes, there is potential for a greater diversity and level of activity within the proposed CH area, including increased oil and gas exploration, development, and production; commercial fishing; recreation/tourism; shipping; and military activity. This potential long-term increase in economic activity is beyond the 10-year temporal scope of this analysis. However, as discussed below, increased economic activity may increase

[213] In addition to costs and benefits arising from Section 7 consultations, indirect costs may also arise that are not associated with a consultation, while some educational/scientific/passive use benefits may arise from the designation itself.

[214] Swem, Ted, Branch Chief. Endangered Species, U.S. Fish and Wildlife Service. Personal communication with Barbara Wyse, Senior Project Economist, Cardno ENTRIX, April 15, 2013.

both the frequency and the types of Section 7 consultations on activities in proposed CH, with potentially greater future costs and benefits associated with CHD.

6.1 Oil and Gas Exploration, Development, and Production

One of the primary economic activities within and adjacent to the proposed Arctic ringed seal proposed CH is oil and gas exploration, development, and production. The oil and gas industry has been active in areas adjacent to the proposed CH since the 1960s. Within proposed CH, however, production is currently limited to one oil company operating in the North Star Unit in the Beaufort Sea. Within this unit, only one-third of production is located in Federal waters.

Exploration and potential future development activities are ongoing in other Federal waters within proposed CH. One oil company has begun exploration in the Beaufort Sea and two others have exploration programs that are in various stages of review with the BOEM. **Section 5.4.1** and **Section 5.4.2** describe oil and gas activities in more detail.

6.1.1 Potential Costs to Oil and Gas

Because of Arctic ringed seal CHD, the oil and gas sector faces *potential* additional administrative costs associated with Section 7 consultations. NMFS has estimated the number of future consultations for the oil and gas sector, based on the frequency of MMPA authorizations, as well as projected levels of offshore oil and gas exploration, development, and production activity within the proposed CH (as outlined by exploration activity "Level 3" described in the supplemental draft environmental impact statement prepared to analyze the effects of offshore oil and gas exploration activities in the U.S. Chukchi and Beaufort seas (NMFS 2013)).

NMFS estimates that 102 ***formal*** consultations, two ***re-initiations of formal*** consultations, five ***informal*** consultations, and ***one re-initiation of informal*** consultation on oil and gas activities could occur over the next ten years. These include consultations on the following oil and gas-related activities:

> 60 formal consultations for deep-penetration and high-resolution surveys (five open-water and one on-ice annually)

> 40 formal consultations for exploratory drilling (two consultations for drilling in Chukchi Sea and two for drilling in Beaufort Sea annually)

> 1 formal consultation for the next OCS oil and gas leasing period

> 1 formal consultation for operation of offshore facilities

> 2 re-initiations of formal consultations: one for BOEM authorization of surveys and exploratory drilling (to address the Arctic ringed seal CHD), and one for operation of offshore facilities

> 4 informal consultations for minor activities occurring in the NPR-A and in the three actively producing onshore units with leases entering State waters of the Beaufort Sea

> 1 re-initiation of informal consultation of the Integrated Activity Plan for NPR-A

> 1 informal consultation to update the Integrated Activity Plan for the NPR-A

Although potential project modifications resulting from future consultations must be reviewed on a case-by-case basis, NMFS does not expect that CHD will result in *incremental* project modifications for oil and gas activities (i.e., NMFS does not anticipate additional project modifications to oil and gas activities above and beyond those associated with the jeopardy standard). Similarly, according to the USFWS, prior to vacature of the polar bear CHD, no consultations on activities within polar bear CH resulted in project modifications that were additional to those required to protect the species, and there were no time delays associated with addressing CH in new consultations.

The direct cost of the additional effort to address potential adverse modification to CH in each new formal and informal consultation is estimated at $19,300 and $7,400, respectively (see **Table 3-1**). Re-initiation of a formal consultation is estimated to cost $23,600, whereas re-initiation of an informal consultation is estimated to cost $10,100.

Total costs of the projected consultations, in undiscounted dollars, is $2,063,000, of which $473,000 (23 percent) will be borne by Federal agencies and $1,590,000 will be borne by the oil and gas sector.

While not quantifiable at this time, the oil and gas industry may also incur indirect costs associated with future "third-party" litigation over specific consultations is successful and creates delays or other sources of regulatory uncertainty. Absent such future litigation, which is too uncertain and unknown to be estimated in this analysis, there may be limited indirect costs to the oil and gas sector attributable to proposed Arctic ringed seal CH.

NMFS does not expect to consult on the effects of gas sector activities on Arctic ringed seal CH within the next ten years. However, several studies (see **Section 5.4.1**) project increased natural gas exploration, development, and production within CH waters within the next thirty years. Growth in such gas activity, coupled with projected increases in oil activity, would increase the annual frequency of consultations involving the oil and gas sector in future years, compared to the frequency of consultations projected for the 10-year analytical period.

6.1.2 Potential Benefits to Oil and Gas

No substantive additional benefits of CHD are expected to accrue to oil and gas activities in the affected area.

6.2 Mining

Commercial mining projects within the proposed CH are limited to two dredging sites in waters adjacent to Nome, Alaska. Federal permits are not required for these dredging operations as all mining occurs on State lands.[215]

6.2.1 Potential Costs to Mining

There are no anticipated costs of the proposed CHD to the mining sector. One ***informal*** consultation, with costs borne by Federal agencies, is expected in 2021, when the next round of lease sales for the Nome offshore site is anticipated to occur. The cost of this informal consultation is estimated at $7,400, of which $6,800 will be borne by BOEM, as the Federal action agency, and $600 will be borne by NMFS as the consulting agency.

6.2.2 Potential Benefits to Mining

No substantive additional benefits of CHD are expected to accrue to mining activities in the affected area.

6.3 Ports

Primary port facilities serving summer vessel traffic within proposed Arctic ringed seal CH include the Port of Nome (medium-draft port), the Port of Kotzebue (shallow-draft port), and the Delong Mountain Terminal Port (shallow-draft port.) There are also numerous docks located throughout the proposed CH servicing barges and small vessels, including at Prudhoe Bay and Barrow.

All three primary port facilities have plans for expansion, although none anticipate in-water construction to occur in the next ten years. Federal and State planning efforts are underway to expand existing ports and

[215] Alaska Department of Natural Resources. Division of Mining. 2013. *Nome Offshore Mining Information.* Website: http://dnr.alaska.gov/mlw/mining/nome/index.cfm

potentially establish a deep draft Arctic port within the boundaries of proposed Arctic ringed seal CH; as planning is still in the site selection phase, no construction of such a deep draft port is expected within the 10-year timeframe of this analysis.

6.3.1 Potential Costs to this Sector

There are no anticipated costs to ports within the 10-year analysis period as in-water construction is not anticipated at any port facility within this timeframe. However, Federal agencies are expected to bear the costs of one ***informal*** consultation on USACE maintenance dredging of the Nome Harbor entrance. In October 2012, USACE completed an Environmental Assessment of Nome Harbor dredging for the period 2013 to 2022. The direct cost of the additional effort to address potential adverse modification to CH in a new, informal consultation entirely due to CHD is estimated at approximately $15,100, of which approximately $7,500 will be borne by USACE, as Federal Action Agency, $5,000 will be borne by the Port of Nome as a third-party, and $2,600 will be borne by NMFS.

6.3.2 Potential Benefits to this Sector

No substantive additional benefits of CHD are expected to accrue to port activities in the affected area.

6.4 Commercial Fisheries

Commercial fishing within the proposed Arctic ringed seal CH is currently limited to the Bering Sea. (Under the Arctic FMP, no commercial fisheries will be authorized in the Beaufort and Chukchi Seas in the Arctic Management Area until sufficient information is available to support the sustainable management of a commercial fishery.) Data from NMFS and ADF&G indicate that commercial fishing vessels operating within the proposed CH land salmon, halibut, groundfish, and crab. Halibut fishing, which is managed by NMFS under terms of the IPHC, occurs in Federal waters throughout the Bering Sea portion of the proposed CH. Federal waters salmon and crab commercial fisheries management is deferred to ADF&G, with Federal oversight. Catch data indicate that commercial salmon catch within proposed CH is primarily, if not exclusively, from State waters in Norton and Kotzebue sounds. There is also an important crab fishery in Norton Sound. Some groundfish and halibut fishing has taken place in northerly regions of the Bering Sea, and expectations are that fishing activity within proposed CH may expand in the future, if climate change results in commercially important fish stocks moving northward. More detail on commercial fishing is provided in **Section 5.4.4**.

6.4.1 Potential Costs to Commercial Fisheries

Costs of the proposed CHD related to commercial fisheries are limited to administrative costs borne fully by NMFS; there are no projected direct costs of the proposed Arctic ringed seal CHD to the commercial fishing sector. NMFS projects two ***formal*** consultations on commercial fisheries within the 10-year period (on the Arctic FMP and the BSAI Management Plan). The costs of these consultations would be borne by NMFS, as NMFS is both the action agency and the consulting agency. The direct costs of the additional effort to address potential adverse modification to CH are estimated at $19,300 per consultation, for a total of $38,600 in costs to NMFS for two formal consultations. NMFS does not anticipate that these consultations would require any project modifications due to proposed CHD that would be above and beyond those required under the jeopardy standard.

Some potential exists for interplay between commercial fisheries (e.g., Bering Sea groundfish trawl fisheries) and Arctic ringed seal habitat EFs, as several Arctic ringed seal prey species may be caught or otherwise impacted by trawl fisheries. As noted in NMFS' final listing of the Arctic ringed seal, "commercial fisheries target a number of known ringed seal prey species such as walleye pollock (Theragra chalcogramma), Pacific cod, herring (Clupea sp.), and capelin. These fisheries may affect Arctic ringed seals indirectly through reductions in prey biomass and through other fishing mediated changes in Arctic ringed seal prey species." With continued sea ice diminishment and the potential for

commercially important fish species to move into more northern waters, interest in commercial fisheries north of the Bering Strait has increased.[216] Consequently, beyond the 10-year analysis time period, it is possible that the frequency and nature of consultations on management of commercial fishing may change, with potential economic and operational impacts on commercial fisheries.

6.4.2 Potential Benefits to Commercial Fisheries

It is possible that commercial fisheries, as well as the related market sectors, will experience small benefits from CHD, as several commercially important fish stocks share habitat with the Arctic ringed seal. Stocks of these other fish species may directly benefit as a result of the protected habitat. Healthy, abundant fish stocks have the potential to yield economic benefits to those that harvest, process, market, and consume them.

6.5 Alaska Native and Subsistence Use

Subsistence use in proposed CH is managed by State and Federal entities. Subsistence use of resources found within the proposed CH includes fish, shellfish, and marine mammals. Subsistence harvest of Arctic ringed seals and other marine mammals is a traditional practice among Alaska Native peoples in the area.

6.5.1 Potential Costs

NMFS does not anticipate consultations on subsistence activities, so there is no expected cost of proposed CHD to subsistence users due to any such consultations.

6.5.2 Potential Benefits

Subsistence users will likely experience increased use values from CHD, with potential for accrual of both direct and indirect use benefits. Subsistence harvest of Arctic ringed seals is a traditional practice of Alaska Native populations. To the extent that CHD reduces degradation of Arctic ringed seal habitat and enhances the conservation of the species, it also preserves the opportunity for future generations of Alaska Natives to engage in their traditional subsistence practices, a direct use benefit with social, cultural, and nutritional values.

Subsistence users may also indirectly benefit from CHD if populations of fish, shellfish, and other marine mammals important to such subsistence users are maintained or enhanced by CHD. For example, if CHD increases the abundance of fish stocks targeted by subsistence users, subsistence fishermen may experience increased catch rates and lower cost-per-unit effort of acquiring food resources. The increased catch rate could provide use benefits to subsistence users, both inside and outside of CH. First, trading traditions among subsistence communities may distribute benefits of increased catch success across a much wider region of rural Arctic Alaska. And, second, since many species of fish and shellfish migrate as populations increase or life cycles progress, there may be transfer and, thus, increases in fish stocks, to areas outside of the proposed CH. Furthermore, subsistence users may benefit from other environmental quality enhancements that may result from CHD, such as improved aesthetics associated with water quality, limited disturbance, etc.

It is also the case that increased catch rates by subsistence users enhances their relative “efficiency”, which in a mixed-economic system, makes more time available for employment in wage-earning endeavors; or, which in a strict subsistence economic-system, allows additional opportunities to undertake other life-tasks, such as acquisition of other subsistence necessities (e.g., hunting, gathering).

[216] Alaska State Legislature. Northern Waters Task Force. 2012. *Findings and Recommendations of the Northern Alaska Waters Task Force*. Website: http://housemajority.org/coms/anw/pdfs/27/NWTF_Full_Report_Color.pdf.

6.6 Recreation and Tourism

Limited recreation and tourism activities occur in the proposed CH waters (cruises) and in and near population centers adjacent to the proposed CH (wildlife viewing, rafting, sport fishing). It is not expected that there will be any consultations required for these activities due to CHD. None of these activities appear to have a Federal nexus triggering consultation under ESA.

6.6.1 Potential Costs

The Arctic ringed seal CHD is not anticipated to adversely impact recreation or tourism.

6.6.2 Potential Benefits

Several aspects of recreation and tourism may benefit from CHD. As recreation and tourism activities within and adjacent to the proposed CH areas are limited, these benefits are likely limited.

6.7 Commercial Shipping and Marine Transportation

Marine vessels operating within the proposed Arctic ringed seal CH include oil and gas tankers, container ships, cargo ships, cruise ships, research vessels, fishing vessels, icebreakers, and, occasionally, private vessels operated by adventurers transiting the NW passage route. Commercial shipping and most other vessel traffic, particularly in CH waters north of the Bering Strait, occurs mainly in the summer months when sea ice is at a minimum. Marine vessel activity within the proposed CH is highest south of the Bering Strait, but vessel traffic north of the Bering Strait is expanding. Vessel traffic within the proposed CH, along established shipping and proposed transit routes, is predicted to increase in the future in response to a longer ice-free shipping season (as sea ice melts earlier in the spring and reforms later in the fall) predicted by climate models. **Section 5.4.7** describes commercial shipping and marine transportation activities in more detail.

6.7.1 Potential Costs to Commercial Shipping and Marine Transportation

Within the 10-year analytic period, NMFS does not anticipate any additional costs to the commercial shipping and marine transportation sector due to the proposed Arctic ringed seal CH. Section 7 of the ESA does not apply generically to vessel movement or activity. As described in **Section 3.1**, Section 7 consultation requirements apply only when there is a Federal action (actions authorized, funded, or carried out by a Federal agency). The proposed CHD for the Arctic ringed seal is, therefore, not anticipated to require any additional restrictions on barge and vessel movement, above and beyond any such restrictions already being imposed following Section 7 consultations to avoid jeopardy to the species.

NMFS does anticipate one ***formal*** consultation with the USCG on new vessel routing measures in the Bering Strait, as proposed by the USCG in the Bering Strait PARS (administrative costs of this consultation are estimated below in **Section 6.9**). As discussed above in **Section 5.4.4**, these proposed vessel routing measures are intended to increase the efficiency of vessel traffic in the Bering Strait and to reduce the risk of marine casualties. NMFS does not anticipate that a formal consultation on proposed new vessel routing measures in the Bering Strait will result in project modifications associated with Arctic ringed seal CHD, so no costs to the commercial shipping and marine transportation sector are anticipated from this consultation.

Although vessel traffic in the Arctic is not anticipated to increase significantly in the near-term[217], it may increase substantially in the long-term (i.e., past the 10-year timeframe of this economic impact analysis) with continued Arctic sea ice reduction (see discussion in **Section 5.4.4**). With continued growth in

[217] Arctic Council. 2009. Arctic Marine Shipping Assessment.

vessel traffic, the USCG may propose additional vessel transit or other rules (beyond those recommended in the Bering Strait PARS), or other Federal agencies may issue regulations on shipping and marine transportation activities by U.S. vessels within proposed Arctic ringed seal CH. Such Federal actions would require consultation. Whether such consultation would occur, and whether it would result in any project modifications under the adverse modification standard is not known, but it is possible given the potential threat to Arctic ringed seal habitat from shipping. As NMFS notes in the final rule listing the Arctic ringed seal:

> *The most significant risk posed by shipping activities in the Arctic is the accidental or illegal discharge of oil or other toxic substances carried by ships, due to their immediate and potentially long-term effects on individual animals, populations, food webs, and the environment. Shipping activities can also affect ringed seals directly through noise and physical disturbance (e.g., icebreaking vessels), as well as indirectly through ship emissions and the possibility of introducing exotic species that may affect ringed seal food webs.*[218]

The threat posed to Arctic ringed seal habitat from shipping activities depends on the type, location, and intensity of the shipping activity. The concentration of shipping activity in relatively narrow transit routes within the large geographic area of proposed Arctic ringed seal CH limits the potential impact of shipping on the proposed Arctic ringed seal CH. While future threats to Arctic ringed seal habitat from increased shipping activity in the Arctic is uncertain, the concentration of shipping in localized areas indicates that such threats, and therefore, the likelihood of consultations requiring modification, may be quite low. Indirect costs from such consultations are therefore also expected to be *de minimus*.

6.7.2 Potential Benefits to Commercial Shipping and Marine Transportation

No substantive benefits of CHD are expected to accrue to shipping activities in the affected area.

6.8 Military Activities

Military activities in the proposed CH include military vessel traffic (marine, submarine, and aircraft), sonar, radar, icebreaking, emergency response, and training exercises.[219] Military activity in the Arctic has increased in recent years[220] due to growing commercial activity, international competition, and possible strategic challenges in the region. There are currently no year-round military bases adjacent to the proposed CH. However, in 2012, the USCG established a summer base in Barrow. The Alaska State Legislature's Alaskan Northern Waters Task Force has recommended establishment of a permanent federal Arctic base, potentially in an area adjacent to the proposed CH.

6.8.1 Potential Costs

NMFS anticipates that the activities of the USCG will generate three ***formal*** consultations in the next ten years because of the CHD. These consultations are expected to be associated with the following three activities or projects: USCG icebreaking activities in proposed CH; the Unified Response Plan which governs Federal, State, and local response to oil and other hazardous material discharges; and vessel routing measures as recommended in the Bering Strait PARS.

The cost of each formal consultation to address possible adverse modification to the CH is estimated at $19,300, for a total cost of $58,000. All costs will be borne NMFS and by the USCG (and/or EPA in the

[218] Endangered and Threatened Species. Threatened Status for the Arctic, Okhotsk, and Baltic Subspecies of the Ringed Seal and Endangered Status for the Ladoga Subspecies of the Ringed Seal. Final Rule. *Federal Register* / Vol. 77 , No. 249 / Friday, December 28, 2012/Rules and Regulations, [[Page 76705-76738]].

[219] Ibid

[220] National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 2011. *Effects of Oil and Gas Activities in the Arctic Ocean Draft EIS.* Website: http://www.nmfs.noaa.gov/pr/pdfs/permits/arctic_deis_volume2.pdf. Accessed February 15, 2013.

case of the Unified Response Plan) as the Federal action agency. These consultations are not anticipated to result in project modifications that would inflict additional costs upon the USCG or impact national security.

6.8.2 Potential Benefits

No additional benefits of CHD are expected to accrue to military operations in the affected area.

6.9 Interactions between Arctic Ringed Seal and other Protected Species and their Habitats

The proposed Arctic ringed seal CH includes habitat that supports a number of other Federally protected species. ESA-listed species that occur within the proposed Arctic ringed seal CH include polar bear, spectacled eider, Steller's eider, bowhead whale, fin whale, humpback whale, North Pacific right whale and Steller sea lion. Designated CH exists within the proposed Arctic ringed seal CH for spectacled eider (Units 3 and 4, Norton Sound and Ledyard Bay, respectively).

6.9.1 Potential Costs

The Arctic ringed seal CHD is not anticipated to adversely impact other protected species or their habitats.

6.9.2 Potential Benefits

Because other protected species share common elements of the Arctic ringed seal habitat, several may benefit from the CHD. In turn, there are economic benefits to species protection, in general, that accrue to local, State, and National populations, in the form of passive use benefits and ecological service flows.

6.10 Educational, Scientific, Non-Consumptive Use of Arctic Ringed Seal and its Habitat

Scientific and educational efforts associated with the proposed Arctic ringed seal CHD include those of the ISC (an Alaska Native Organization), the ADF&G, and the National Marine Mammal Laboratory.

6.10.1 Potential Costs

The proposed Arctic ringed seal CHD is not anticipated to adversely impact educational, scientific, or non-consumptive use of the Arctic ringed seal or its habitat.

6.10.2 Potential Benefits

There are scientific and educational benefits to the Nation that are generated as the ESA is carried out. It is likely that the proposed CHD will provide education and public awareness benefits through the designation process, which includes public involvement; as well as through efforts that occur as a result of the CHD. It is very difficult to clearly credit the CHD, itself, with specific additional educational or scientific benefits, because the study of the Arctic ringed seal is motivated by scientists and other interested citizens, largely irrespective of the formal listing or CHD. Still, the specific identification of features essential to the conservation of Arctic ringed seals, and where they occur, can help focus, inform, and promote education and scientific efforts by other parties.

6.11 Summary of Benefit-Cost Analysis of Critical Habitat Designation

Table 6-1 provides a summary of the total incremental post-designation costs that are anticipated due to Arctic ringed seal CHD. These costs stem from the Section 7 consultations, outlined in **Sections 6.1** to **6.10**. The post-designation incremental costs are estimated to range from $1.33 million to $1.86 million,

in present value terms, depending on the discount rate employed.[221] Federal agencies are anticipated to bear at least 27 percent of these costs.

Table 6-1 Total Costs of Critical Habitat Designation, in 2012 dollars (rounded to the nearest $1,000)

Entity Bearing Cost	PV 3%	PV 7%
Federal Agency	$500,000	$356,000
Local Government	$4,000	$3,000
Private Entity	$1,356,000	$968,000
Total	**$1,860,000**	**$1,327,000**

Notes:

For estimating Section 7 consultation costs with uncertain or unclear timelines (or ranges), it is assumed that there is an equal probability of these occurring over the specified range of time.

Totals may not sum due to rounding.

Reduced or avoided degradation of Arctic ringed seal habitat that may result from CHD would benefit arctic ringed seals, as well as many other wildlife and fish species that share the habitat, in ways that could, in turn, provide benefits to a number of sectors and user groups, including commercial fisheries, subsistence use, recreation/tourism, and education/scientific knowledge. It is expected that the CHD will also enhance passive-use benefits among those who value the species and the habitat essential for its conservation. The benefits of the proposed CHD described above cannot be fully quantified or monetized, and in some instances may be co-extensive with benefits of the listing of the Arctic ringed seal as threatened. Still, incremental benefits of the CHD will likely result from the designation, and these incremental benefits are not negligible.

[221] For each sector/activity/project, this analysis compares economic costs incurred in different time periods in present value terms. The present value represents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of future cash flows expressed in today's dollars. This analysis captures the projected future costs over a 10-year period, and the specific years in which these costs are expected to be incurred are presented in the preceding discussion and summarized in the last column of Table 5-18.

7 Expected Net Benefit to the Nation of Arctic Ringed Seal Critical Habitat Designation

As per the requirements of the ESA and EO 12866, all effort is made in this RIR/4(b)(2) Preparatory Assessment/IRFA to comprehensively identify (and, wherever possible, quantify or monetize) benefits and costs associated with the CHD. As is evident in **Section 6**, it is not possible to provide quantitative estimates of the projected benefits that may be uniquely attributable to CHD for the Arctic ringed seal. While not quantifiable at this time, the primary expected benefits of the CHD include enhanced education, scientific knowledge, and intrinsic non-use values associated with habitat protection. There are no project modifications expected to result from the consultation process; however, enhanced public awareness of the habitat features essential to conservation of the Arctic ringed seals and where they are found, which is expected to result from the CHD, could still influence the design, location, or other aspects of proposed projects or activities such that incremental conservation benefits are realized. It appears that if the benefits were to be quantified and monetized, the anticipated benefits outweigh the anticipated costs (with costs estimated at between $1.33 million to $1.86 million). NMFS is of the opinion that the proposed Arctic ringed seal CHD can be expected to result in a net benefit to the Nation.

8 Distributional Impacts of Arctic Ringed Seal Critical Habitat Designation

This section identifies the distribution of impacts by economic sector, and also provides an evaluation of environmental justice based on the proportion of impacts expected to be borne by low-income and/or minority populations.

8.1 Impacts by Economic Sector

Table 8-1 presents expected economic costs and benefits to each sector over the next ten years. Other than approximately $3000 to $4,000 in costs borne by a local government (City of Nome), all expected costs are borne by the federal government (27 percent of costs) or the oil and gas sectors (73 percent of costs). As all expected costs are administrative, there are no expected indirect regional economic impacts to other sectors linked to the sectors analyzed in this study (i.e., no impacts to sectors purchasing or supplying goods or services to the analyzed sectors).

Table 8-1 Costs and Benefits of Critical Habitat Designation by Sector or User Group

	Present Value Costs		
Sector / User Group	3% Discount Rate	7% Discount Rate	Benefits Expected
Oil and Gas	$1,356,000	$968,000	None likely.
Mining	$0	$0	None likely.
Commercial Shipping / Marine Transportation	$0	$0	None likely.
Commercial Fisheries	$0	$0	Possible indirect use benefits if CHD results in more healthy, abundant fish stocks within CH boundaries or farther south due to fish migration.
Native Alaska and Subsistence Users	$0	$0	Possible direct and indirect use benefits if CHD results in enhanced marine mammal and fish populations (and associated enhanced subsistence harvest success or reduced effort) and improved Arctic environmental quality.
Recreation and Tourism	$0	$0	Possible direct and indirect use benefits if CHD results in improved Arctic environmental quality (e.g., increases aesthetics) or enhanced marine mammal/fish populations important for wildlife viewing or fishing.
Educational, Scientific, Non-Consumptive Users	$0	$0	Possible indirect benefits of increased understanding of the species, its Arctic habitat, and threats to its persistence. Possible direct non-use benefits of species and habitat protection.

	Present Value Costs		
Sector / User Group	3% Discount Rate	7% Discount Rate	Benefits Expected
Federal Government	$500,000	$356,000	Possible indirect benefits of increased understanding the species, its Arctic habitat, and threats to its persistence.
Local Government / Ports	$4,000	$3,000	None likely.
Total	$1,860,000	$1,327,000	Possible indirect scientific knowledge/education benefits, indirect and passive use benefits of enhanced conservation, and direct and indirect subsistence, recreation, and fisheries benefits.

Notes:

For estimating Section 7 consultation costs with uncertain or unclear timelines (or ranges), it is assumed that there is an equal probability of these occurring over the specified range of time.

Totals may not sum due to rounding.

8.2 Environmental Justice Impacts on Low Income and Minority Populations

The EPA's Office of Environmental Justice offers the following definition of environmental justice:

> *"The 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. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies."*

The concept of environmental justice is rooted in the Civil Rights Act of 1964, which prohibited discrimination in Federally-assisted programs, and in EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations," issued February 11, 1994. EO 12898 was intended to ensure that Federal actions and policies do not result in disproportionately high adverse effects on minority or low-income populations. It requires each Federal agency to incorporate environmental justice into its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including social or economic effects, of its programs, policies, and activities implemented both directly and indirectly (for which it provides permitting or funding), on minority populations and low-income populations of the U.S. (President's Council on Environmental Quality 1997). Additional guidance from the President's Council on Environmental Quality clarifies that environmental justice concerns may arise from effects on the natural and physical environment that produce human health or ecological outcomes, or from adverse social or economic changes.

No adverse human health effects are anticipated from CHD, and only positive environmental effects are anticipated to accrue from the additional protections provided to the Arctic ringed seal EFs. Therefore, the relevant remaining question is, are there potential adverse social or economic effects to minority and low-income populations due to CHD. To identify whether potential disproportionately high adverse social or economic effects will occur within minority or low-income populations as a result of CHD, first it is necessary to determine whether or not any of the potentially affected activities have high rates of participation among any minority or low-income groups, and then to determine whether there are any adverse impacts anticipated as a result of CHD.

As discussed in **Section 5.2**, compared to the State and the Nation, the Study Area is characterized by a disproportionately high proportion of minority residents and low-income residents. As presented in **Table 5-4**, residents in all boroughs and census areas in the Study Area are disproportionately minority, specifically AIAN. Across the Study Area, minorities account for 88.8 percent of the population. Also, as presented in **Table 5-5**, with the exception of the North Slope Borough, data on the poverty rate, per capita income, and unemployment rate in all boroughs and census areas in the Study Area indicate that residents are disproportionately low income compared to the State and the Nation. Based on the relatively high proportion of low-income and minority residents in the Study Area, any adverse social or economic impacts of CHD that would be incurred by Study Area residents would likely be disproportionately felt by low-income and minority individuals.

As presented above in **Table 8-1**, 27 percent of CHD costs are expected to accrue to Federal agencies, with negligible to no economic or social impact to residents of the Study Area. Nearly all remaining costs would accrue to the oil and gas industry, with very small costs ($4,000) incurred by the City of Nome, as owner of the Port of Nome facility. Costs to the oil and gas industry are expected to be limited to administrative costs of consultation, with no anticipated incremental project modifications above and beyond requirements related to the listing of the species. These consultations would slightly increase operating costs for oil and gas sector activities (with minor impacts on profitability for shareholders[222]), but are not anticipated to change the level of oil and gas sector activities within CH. As such, there are no anticipated impacts of CHD to oil and gas-related employment, income, or taxes, and thus no anticipated adverse social or economic impacts to Study Area residents.

The only costs expected to be borne primarily within the Study Area are the approximately $4,000 in consultation costs incurred by the City of Nome, associated with dredging of the Nome Harbor. These costs would ultimately be borne by City of Nome taxpayers, who are disproportionately minority and low-income. However, as these small costs (less than 0.2% of total expected costs of CHD) are the only costs expected to be primarily borne by residents within the Study Area, within the context of total costs of CHD, disproportionate economic effects on low-income or minority populations are not anticipated.

While no disproportionate economic impacts are anticipated, it is important to note that AIAN minority populations disproportionately participate in subsistence activities in the Study Area. CHD will not adversely affect the continued subsistence harvest of Arctic ringed seals. No costs are therefore anticipated for subsistence users due to the proposed CHD.

[222] There is no reason to believe that oil and gas company shareholders are disproportionately low-income or minority.

9 Area Exclusions Based upon Economic, National Security, or Other Relevant Impacts - A Section 4(b)(2) Preparatory Assessment of Arctic Ringed Seal Critical Habitat Designation

This section documents NMFS's compliance with Section 4(b)(2) of the ESA regarding impacts of proposing to designate CH for the Arctic ringed seal. Specifically, Section 4(b)(2) requires NMFS to consider the economic impact, impact on national security, and any other relevant impact, of specifying any particular area as CH. Section 4(b)(2) also provides NMFS with discretion to exclude particular areas from a designation, but only if the benefits of excluding that area outweigh the benefits of including it in the designation, and exclusion will not result in extinction of the species. The following subsection summarizes Section 4(b)(2) requirements, as informed by previous designations and key court rulings. A synthesis of the economic, national security, and other relevant impacts of the final CHD follows. Finally, this section discusses the particular area(s), recommended for exclusion from the CHD, based on the economic, national security, or other relevant impacts identified.

9.1 Section 4(b)(2) Requirements

This subsection describes the statutory requirements of determining the impacts of CHD. The interpretation of the statute through previous designations and key court opinions informed our process.

9.1.1 The Statutory Language and Consideration of Potential Impacts of Designation

Section 4(b)(2) of the ESA states:

> *The Secretary shall designate critical habitat, and make revisions thereto, under subsection (a)(3) of this section on the basis of the best scientific data available and after taking into consideration the economic impact, impact on national security, and any other relevant impact, of specifying any particular area as critical habitat. The Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned.*[223]

Impacts may result from a CHD primarily through compliance with Section 7 of the ESA.[224] Section 7(a)(2) of the ESA requires Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species or destroy or adversely modify designated CH. If a Federal action may adversely affect a species listed under the ESA or its designated CH, the responsible Federal agency must enter into consultation with NMFS (or the USFWS, as applicable). The added administrative costs of including consideration of CH in Section 7 consultations, and the additional costs of implementing any project modifications resulting from consultations with NMFS to avoid destruction or adverse modification of CH, above and beyond those it would already recommend because of the listing status of the species, are the direct compliance costs of a CHD.

In addition, because CH is, by definition, "essential to the conservation" of the species, conservation benefits to the listed species occur as a result of the consultation process, when project modifications are

[223] 16 U.S.C. §1533

[224] 16 U.S.C. §1536.

implemented that avoid destruction or adverse modification of CH. Such project modifications may also moderate adverse impacts to other components of the ecosystem. In the case of the ringed seal CHD, NMFS does not anticipate that the proposed CHD will result in any additional project modifications above and beyond those required due to the species' threatened status. Therefore, the benefits of CHD are likely to be primarily those associated with education/outreach, subsistence, and nonuse/passive-use value. Still, it is also possible that enhanced awareness of the habitat features essential to conservation of Arctic ringed seals and where they are found, which is expected to result from the CHD, could proactively influence the design, location, or other aspects of proposed projects or activities in ways that benefit the conservation of the Arctic ringed seals. The benefits of CHD are likely to include those associated with education, public awareness, and scientific knowledge, as well as nonuse/passive-use values. Benefits are also likely to extend to subsistence use. Other user groups, such as recreation/tourism and fishing may also experience benefits.

Comments on previous CHDs have suggested that secondary costs to regional economies can also result from project modifications associated with Section 7 consultation. For example, concerns have been raised where CH is being designated in areas of residential development that the designation will lead to reduced revenues and employment in construction-related firms, potential lost tax revenue associated with decreased residential development, and even impairment of regional growth.[225] In other designations, concerns have been expressed that CHD may require alteration in shipping channel dredging projects or commercial fishing activities to such an extent that it would result in regional economic impacts.[226] These do not appear to be relevant concerns in the present Arctic ringed seal CHD context.

Aside from the protections provided through Section 7, the ESA imposes no other requirements or limitations on any entities or individuals as a result of CHD. Benefits to the listed species and its CH may nonetheless result from a designation, if state or local governments enact protective legislation or regulations to complement the ESA protections. Similarly, a designation may raise public awareness and sensitivity to the status of listed species and the importance of designated CH areas for conservation. As a result, individuals or entities may modify their activities to avoid harm to the species or habitat, contribute to conservation efforts, or seek to view the species in the wild.

9.1.2 Key Legal Interpretations

The ESA does not specify methods for identifying and considering the impacts of CHD, and previous designations have used a variety of approaches, based on the differing facts and circumstances of the species and habitat involved. As described below, the legislative history informs these analyses, and several important court opinions have evaluated the legal sufficiency of these analyses and clarified a number of important aspects of these statutory provisions.

Section 4(b)(2) consists of two steps: an initial mandatory requirement that the agency consider certain impacts of CHD, and a discretionary step wherein the agency, informed by those considerations, may propose excluding particular areas from the designation. The ESA's legislative history explains the broad latitude afforded to NMFS in its consideration of impacts:

> *"Economics and any other relevant impact shall be considered by the Secretary in setting the limits of critical habitat for such a species. The Secretary is not required to give economics or any other*

[225] Southern Arizona Homebuilders Association. See, e.g., Elliott D. Pollack and Company. 1999. *The Economic and Fiscal Impact of Designation of 60.060 Acres of Privately Owned Land in Pima County, Arizona as Critical Habitat for the Cactus Ferruginous Pygmy-Owl*.

[226] U.S. Fish & Wildlife Service. See, e.g., Industrial Economics, Incorporated (IEc). 2003. *Economic Analysis of Critical Habitat Designation for the Gulf Sturgeon*. Prepared for the Division of Economics.

"relevant impact" predominant consideration in his specification of critical habitat...The consideration and weight given to any particular impact is completely within the Secretary's discretion."[227, 228]

Clearly, NMFS may exclude particular areas that otherwise meet the definition of CH from a designation, on a determination that the benefits of exclusion outweigh the benefits of including the area(s), and exclusion will not result in the species' extinction. This step is entirely discretionary, and does not require exclusion in any circumstances.

One court has held that an agency's decision not to exercise its discretion to exclude areas is not subject to judicial review.[229] The court based this conclusion on the broad latitude provided to the agency in consideration of impacts described above, the discretionary nature of the exclusion provision, and the fact that the statute provides substantive standards only for the review of actual exclusions (i.e., the Secretary must determine that the benefits of exclusion outweigh the benefits of inclusion for particular areas). In contrast, the statute includes no substantive standards for a court to review a decision not to exclude areas from a designation.

Regarding consideration of economic impacts, the U.S. District Court for the Eastern District of California has noted that the term "impacts" is not specific and can be both positive and negative;[230] NMFS believes this logic applies equally to national security impacts and other relevant impacts. Therefore, this report identifies and considers positive and negative economic, national security, and other relevant impacts that may result from designating Arctic ringed seal CH. These impacts are discussed in detail in **Section 6**. The following section provides a synthesis of the impacts of CHD for the Arctic ringed seal, and is followed by an exclusion analysis.

9.2 Synthesis: Impacts of Including the Proposed Area in the Critical Habitat Designation for the Arctic Ringed Seal

This section summarizes the expected economic, national security, and other impacts of proposed CHD.

9.2.1 Economic Impacts

The projected economic costs of the CHD stem, primarily, from the projected Section 7 consultations on the ongoing and planned activities in the area (see **Section 6** for details). In present value terms, the costs of these consultations are estimated to be $1,327,000 using a discount rate of seven percent, and $1,860,000 using a discount rate of three percent. The projects and activities projected to require consultation within the 10-year analysis period include, among others, oil and gas exploration, maintenance dredging of the Nome Harbor, dredge mining near Nome, commercial FMPs and regulations, USCG vessel routing measures, and the Unified Response Plan for response to hazardous discharges.

The purpose of the proposed CHD is to assist in the conservation and recovery of the Arctic ringed seal. CHD may generate other incremental benefits to the nation, including, scientific and educational advancements, subsistence and cultural benefits, and passive-use value.

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227 H.R. Rep. No. 95-1625, at 16-17 (1978), 1978 U.S.C.A.N. 9453, 9466-67.

228 The provisions requiring consideration of impacts were originally discussed as applicable only to critical habitat designations for invertebrate species. However, Section 4(b)(2) as enacted is not limited to invertebrates, and NMFS and USFWS have applied the provision to designations for vertebrate and invertebrate species.

229 Home Builders Association of No. Calif. et al., v. U.S. Fish and Wildlife Service. 2006. U.S. Dist. LEXIS 80255 at 45-46 (E.D. Cal., Nov. 1, 2006).

230 Id. at 54, citing Butte Envtl. Council v. Norton, slip op., 04-0096, at 12 (N.D. Cal. Oct. 28, 2004).

9.2.1.1 National Security Impacts

NMFS has prepared a preliminary analysis to address the requirements of Section 4(a)(3) and 4(b)(2)of the ESA concerning evaluation of national security impacts. This analysis is presented in the preamble to the proposed rule designating CH for Arctic ringed seals. Any modifications to this analysis will be considered based on public comments received in response to the proposed CHD. No exemption or exclusion of any particular area is proposed at this time. See the proposed rule published by NMFS in the Federal Register for more details.

9.2.1.2 Other Relevant Impacts

NMFS has prepared a preliminary analysis to address the requirements of Section 4(a)(3) and 4(b)(2)of the ESA concerning evaluation of "other relevant impacts". This analysis is presented in the preamble to the proposed rule designating CH for Arctic ringed seals. Any modifications to this analysis will be considered based on public comments received in response to the proposed CHD. No exemption or exclusion of any particular area is proposed at this time. See the proposed rule published by NMFS in the Federal Register for more details.

9.2.2 Exclusions under Section 4(b)(2)

NMFS has prepared a preliminary analysis to address the requirements of Section 4(a)(3) and 4(b)(2)of the ESA concerning evaluation of national security impacts, "other relevant impacts", and the analysis of benefits of exclusion of particular areas of CH versus the benefits of inclusion of particular areas of CH. This analysis is presented in the preamble to the proposed rule designating CH for Arctic ringed seals. Any modifications to this analysis will be considered based on public comments received in response to the proposed CHD. No exemption or exclusion of any particular area is proposed at this time. See the proposed rule published by NMFS in the Federal Register for more details.

10 Potential Impacts on Small Entities - A Regulatory Flexibility Act Analysis of Arctic Ringed Seal Critical Habitat Designation

The RFA, first enacted in 1980, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a Federal regulation. Major goals of the RFA are: (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require that agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting impacts on small entities as a group, distinct from other entities, and on the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action.

On March 29, 1996, President Clinton signed the Small Business Regulatory Enforcement Fairness Act. Among other things, the new law amended the RFA to allow judicial review of an agency's compliance with the RFA. The 1996 amendments also updated the requirements for a final regulatory flexibility analysis, including a description of the steps an agency must take to minimize the significant economic impact on small entities. Finally, the 1996 amendments expanded the authority of the Chief Counsel for Advocacy of the SBA to file amicus briefs in court proceedings involving an agency's violation of the RFA.

In determining the scope, or 'universe', of the entities to be considered in an IRFA, NMFS generally includes only those entities, both large and small, that can reasonably be expected to be directly regulated by the proposed action. If the effects of the rule fall primarily on a distinct segment, or portion thereof, of the industry (e.g., user group, gear type, geographic area), that segment would be considered the universe for the purpose of this analysis. NMFS interprets the intent of the RFA to address negative economic impacts, not beneficial impacts, and thus such a focus exists in analyses that are designed to address RFA compliance.

The regulatory mechanism through which CH protections are enforced is section 7 of the ESA, which directly regulates only those activities carried out, funded, or permitted by a Federal agency. By definition, Federal agencies are not considered small entities, although the activities they fund or permit may be proposed or carried out by small entities. As discussed in previous sections, other entities, including in some cases small entities, may participate as third parties during ESA section 7 consultations (the primary parties being the Federal action agency and NMFS). Thus small entities may be indirectly affected by the proposed CHD. The SBA, in its guidance on how to comply with the RFA, acknowledges that consideration of indirectly affected small entities is not required by the RFA. It nonetheless encourages agencies to include these small entities when performing an RFA. In the present IRFA, NMFS has adopted this approach.

Data on cost structure, affiliation, and operational procedures and strategies in the sectors potentially subject to the proposed regulatory action are insufficient, at present, to permit preparation of a "factual basis" upon which to certify that the preferred alternative does not have the potential to result in "significant adverse impacts on a substantial number of small entities" (as those terms are defined under RFA). Because, based on all available information, it is not possible to 'certify' this outcome, should the proposed action be adopted, a formal IRFA, focusing on the complete range of available alternatives (including the designated "preferred" alternative), has been prepared and is included in this package for Secretarial review.

10.1 Contents of IRFA[231]

Under 5 U.S.C., Section 603(b) and (c) of the RFA, each IRFA is required to contain:

> A description of the reasons why action by the agency is being considered;

> A succinct statement of the objectives of, and legal basis for, the proposed rule;

> A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;

> A description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;

> An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap or conflict with the proposed rule;

> A description of any significant alternatives to the proposed rule which accomplish the stated objectives (of the proposed action), consistent with applicable statutes, and which would minimize any significant economic impact of the proposed rule on small entities.

Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives, such as:

1. The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
2. The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
3. The use of performance rather than design standards; and
4. An exemption from coverage of the rule, or any part thereof, for such small entities.

10.1.1 Definition of a Small Entity

The RFA recognizes and defines three kinds of small entities: (1) small businesses, (2) small non-profit organizations, and (3) and small government jurisdictions.

Small businesses. Section 601(3) of the RFA defines a 'small business' as having the same meaning as 'small business concern,' which is defined under Section 3 of the Small Business Act. 'Small business' or 'small business concern' includes any firm that is independently owned and operated and which is not dominant in its field of operation. The SBA has further defined a "small business concern" as one "organized for profit, with a place of business located in the U.S., and which operates primarily within the U.S. or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor. A (small) business concern may be in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the firm is a joint venture there can be no more than 49 percent participation by foreign business entities in the joint venture."

The SBA has established size criteria for all major industry sectors in the U.S., and publishes those on its website. For example, SBA defines an oil extraction business as a small business if it is independently owned and operated, not dominant in its field of operation, and employs 500 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. Other SBA industrial sector size criteria pertinent to this analysis are those of support activities for oil and gas operations, and

[231] For a detailed treatment of the requirements of economic analyses in support of RIR and RFAA requirements, see, Queirolo, Lew is E., Ph.D. 2005. *Conducting Economic Impact Analyses*. NMFS, Alaska Region. Juneau, Alaska. July 29, 2005.

port and harbor operations. **Table 10-1**, below, includes the categories of firms in these sectors, as defined by SBA, as well as the specific criterion to be used, for RFA analysis purposes.

Table 10-1 Small Business Size Standards matched to North American Industry Classification System

NAICS Code	NAICS U.S. Industry Title	SBA Small Business Threshold Criteria
Subsector 211 - Oil and Gas Extraction		
211111	Crude Petroleum and Natural Gas Extraction	500 employees (average employment)
Subsector 213 – Support Activities for Mining		
213112	Support Activities for Oil and Gas Operations	$35.5 million (average annual receipts)
Sector 48 -Transportation		
Subsector 488 – Support Activities for Transportation		
488310	Port and Harbor Operations	$35.5 million (average annual receipts)

Source: U.S. Small Business Administration. Effective July 22, 2013. Table of Small Business Size Standards Matched to North American Industry Classification System Codes.

The SBA has established "principles of affiliation" to determine whether a business concern is "independently owned and operated." In general, business concerns are affiliates of each other when one concern controls or has the power to control the other, or a third party controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another concern, and contractual relationships, in determining whether affiliation exists. Individuals or firms that have identical or substantially identical business or economic interests, such as family members, persons with common investments, or firms that are economically dependent through contractual or other relationships, are treated as one party with such interests aggregated when measuring the size of the concern in question. The SBA counts the receipts or employees of the concern whose size is at issue and those of all its domestic and foreign affiliates, regardless of whether the affiliates are organized for profit, in determining the concern's size. However, business concerns owned and controlled by Tribes, Alaska Regional or Village Corporations organized pursuant to the ANCSA (43 U.S.C. 1601), Native Hawaiian Organizations, or Community Development Corporations authorized by 42 U.S.C. 9805 are not considered affiliates of such entities, or with other concerns owned by these entities solely because of their common ownership.

Affiliation may be based on stock ownership when (1) a person is an affiliate of a concern if the person owns or controls, or has the power to control 50 percent or more of its voting stock, or a block of stock which affords control because it is large compared to other outstanding blocks of stock; or (2) if two or more persons each owns, controls or has the power to control less than 50 percent of the voting stock of a concern, with minority holdings that are equal or approximately equal in size, but the aggregate of these minority holdings is large as compared with any other stock holding, each such person is presumed to be an affiliate of the concern.

Affiliation may be based on common management or joint venture arrangements. Affiliation arises where one or more officers, directors, or general partners control the board of directors and/or the management of another concern. Parties to a joint venture also may be affiliates. A contractor and subcontractor are treated as joint ventures if the ostensible subcontractor will perform primary and vital requirements of a contract or if the prime contractor is unusually reliant upon the ostensible subcontractor. All requirements of the contract are considered in reviewing such relationship, including contract management, technical responsibilities, and the percentage of subcontracted work.

Small organizations. The RFA defines "small organizations" as any not-for-profit enterprise that is independently owned and operated and is not dominant in its field.

Small governmental jurisdictions. The RFA defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with populations of fewer than 50,000.

10.1.2 Reason for Considering the Proposed Action

Under provisions of the ESA, at the time a species is listed as threatened or endangered, the listing agency must designate CH for that species, on the basis of the best scientific data available, to the maximum extent prudent and determinable. NMFS concluded that CHD for Arctic ringed seals was prudent, but not determinable at the time of listing and, therefore, would be designated in separate rulemaking. The statutory timelines indicated that the final rule designating CH should be published within one year of the final listing , prompting the present action to designate CH for the Arctic ringed seal.

NMFS has proposed designating as CH for the Arctic ringed seal a single "specific area" within the geographic area occupied by Arctic ringed seals at the time of listing. This area includes waters in the northern Bering, Chukchi, and Beaufort seas, from the MHW line of the mainland coast and islands of Alaska to an offshore limit within the U.S. EEZ (**Figure 2-1**). As discussed in detail in the proposed rule to designate CH for the Arctic ringed seal, NMFS determined that the EFs within this area may require special management considerations or protection. NMFS has not identified any areas outside the geographical occupied by the Arctic ringed seal that are essential for its conservation.

10.1.3 Objectives of, and Legal Basis for, the Proposed Action

The objective of this action is to utilize the best scientific data available, including historical distribution of these animals, feeding and foraging behavior of the species, and EFs to characterize and, as appropriate, designate CH for this species.

This action is proposed under the authority of Section 4 of the ESA.

10.1.4 Description of Any Small Entities Directly Regulated Under the Proposed Action

This section summarizes what is known about the potential indirect adverse economic impacts of Arctic ringed seal CHD on small entities. As discussed in detail in **Section 6** of the RIR for this proposed action, incremental costs of this proposed action are expected to be largely limited to administrative costs of ESA section 7 consultations. Small entities may participate in consultations as a third party (the primary parties being the Federal action agency and NMFS). It is, therefore, possible that such small entities may invest time and resources considering critical habitat during ESA section 7 consultations for Arctic ringed seals, and thus may be indirectly affected by the proposed action, although there is no means of empirically confirming this hypothesis, *a priori*.

Several industry sectors participate in activities that are physically co-extensive with the proposed CHD; and some of these may have members that would qualify as "small businesses" within the RFA analysis meaning of that term.

Table 10-2 summarizes businesses and government entities that engage in activities that are likely to require consideration of critical habitat in ESA section 7 consultations as a result of the proposed action, and potentially meet the standards set forth in the RFA analysis. The four oil and gas companies listed are those that have current activities in Federal offshore waters. All of these oil and gas companies exceed the size criterion established by the SBA for entities in this particular industry. Various other businesses engage in support activities for oil and gas operations that may also require consideration of critical habitat in ESA section 7 consultations, as exemplified by companies listed in **Table 5-13** of the RIR. Given that the identities of individual businesses that engage these support activities vary, **Table**

10-2 does not identify specific companies in this industry that may be indirectly affected by the proposed action. However, with respect to potential effects of the proposed action on small businesses that engage in support activities for oil and gas operations, it is notable that all of the companies identified in **Table 5-13** exceed the SBA size criterion for this industry. No not-for-profit enterprises were identified that are likely to be affected by the proposed action. Two of the three government jurisdictions listed in **Table 10-2** that own ports qualify as "small governmental jurisdictions", serving populations of fewer than 50,000 persons. All entities potentially indirectly affected by the proposed action that are classified as 'large' have been accounted for and treated in the RIR, and are excluded from further analysis within the IRFA.

Table 10-2 Description of Entities Potentially Affected Indirectly by the Proposed Action.

NAICS Code/Industry Title	Entity Title	Average Annual Receipts ($ million)	Size of Entity (Employees or Population)	Small Entity
Sector 21 – Mining, Quarrying, and Oil and Gas Extraction				
Subsector 211 - Oil and Gas Extraction				
211111- Crude Petroleum and Natural Gas Extraction	BP	$349,401[232]	82,900[233]	No
211111- Crude Petroleum and Natural Gas Extraction	Statoil	$115,111[234]	24,893[235]	No
211111- Crude Petroleum and Natural Gas Extraction	ConocoPhillips	$63,803[236]	16,900[237]	No
211111- Crude Petroleum and Natural Gas Extraction	Shell	$435,127[238]	~91,000[239]	No
Sector 48 –Transportation / Government Jurisdictions				
Subsector 488 – Support Activities for Transportation				

232 BP. 2013. Annual Report and Form 20-F 2012. Website: http://www.bp.com/content/dam/bp/pdf/investors/BP_Annual_Report_and_Form_20F_2012.pdf.

233 BP. 2013. Sustainability, BP and Sustainability, BP in figures. Website: http://www.bp.com/en/global/corporate/sustainability/bp-and-sustainability/bp-in-figures.html.

234 Statoil. 2013. Annual Report 2012 on Form 20-F. *Conversion from Norwegian Kroner (NOK) using 2012 year-end exchange rate of 5.57 NOK to 1 USD.* Website: http://www.statoil.com/annualreport2012/en/Download%20Center%20Files/01%20Key%20downloads/11%20Annual%20Report%20on%20Form%2020-F%202012/AnnualreportonForm20-F.pdf.

235 Statoil. 2013. 2012 Annual Report on Form 20-F. Website: http://www.statoil.com/annualreport2012/en/Download%20Center%20Files/01%20Key%20downloads/11%20Annual%20Report%20on%20Form%2020-F%202012/AnnualreportonForm20-F.pdf.

236 ConocoPhillips. 2013. 2012 Annual Report. Website: http://www.conocophillips.com/EN/about/company_reports/annual_report/Documents/2012_Annual_Report.pdf.

237 ConocoPhillips. 2013. 2012 Annual Report. Website: http://www.conocophillips.com/EN/about/company_reports/annual_report/Documents/2012_Annual_Report.pdf. Data for 2012.

238 Shell. 2013. *Shell Annual Report and Form 20-F 2012*. Website: http://reports.shell.com/annual-report/2012/servicepages/downloads/files/entire_shell_ar12.pdf.

239 Ibid.

NAICS Code/Industry Title	Entity Title	Average Annual Receipts ($ million)	Size of Entity (Employees or Population)	Small Entity
488310- Port and Harbor Operations	Port of Nome (City of Nome)	$13.2[240]	2010 Population of 3,598	Yes
488310- Port and Harbor Operations	Port of Kotzebue (City of Kotzebue)	$7.8[241]	2010 Population of 3,201	Yes
488310- Port and Harbor Operations	DeLong Mountain Terminal (State of Alaska)	$16,299.7[242]	2010 Population of 710,231	No

1/ Average value for 2010, 2011, and 2012 unless otherwise noted in table sources.

10.1.5 Reporting, Record-Keeping, and Other Compliance Requirements

As noted above, the proposed action does not impose new record-keeping or reporting requirements on small entities. During a Section 7 consultation under the ESA, the Service, the Action agency, and the third party applying for Federal funding or permitting (if applicable) communicate, in an effort to minimize potential adverse effects to the species and/or to the proposed CH. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, and the potential effects to the species and designated CH associated with the activity that has been proposed. The third party costs associated with these consultations include the administrative costs associated with conducting the consultations, such as the costs of time spent in meetings, preparing letters, and the development of research, such as biological studies and engineering reports. Based on the analysis in **Section 6** of the RIR, **Table 10-3** provides an estimate of the costs, if any, to the two small governmental jurisdictions potentially affected (indirectly) by CHD for the Arctic ringed seal (i.e., third-party incremental costs associated with ESA section 7 consultations).

Table 10-3 Estimated Consultation Costs Related to Small Governmental Jurisdictions Potentially Affected by the Proposed Action

NAICS Code/Industry Title	Entity Title	Projected Number of CH Consultations 2014 2023	Consultation Costs
488310- Port and Harbor Operations	Port of Nome (City of Nome)	1 Informal (Dredging of Harbor)	$4,000
488310- Port and Harbor Operations	Port of Kotzebue (City of Kotzebue)	0	$0

Costs to small entities are estimated at $4,000, using a three percent discount rate, of which 100 percent are to small governmental entities.

[240] City of Nome. 2013. *Fiscal Year General Fund Budget*. Website: http://www.nomealaska.org/egov/docs/1343157122_424194.pdf. City of Nome. 2013. *Management Discussion and Analysis, Basic Financial Statements, Additional Supplementary Information and Compliance Reports, Year Ended June 30, 2012.* Website: http://www.nomealaska.org/egov/docs/1365471645_547637.pdf. Average of FY 2013 proposed, 2012 amended, and 2011 audited revenues.

[241] City of Kotzebue. 2012. Budget Fiscal Year 2013. Website: http://www.cityofkotzebue.com/vertical/sites/%7BA001CDF5-7F45-4E0C-9DFC-D296959501D1%7D/uploads/Final_FY13_BUDGET_Approved.pdf. Average of Fiscal Year 2013, 2012, 2011.

[242] State of Alaska, Department of Revenue, Tax Division, Revenue Sources Book: Fall 2011. Fall 2012. Fall 2013. Websites: http://www.tax.alaska.gov/programs/documentviewer/viewer.aspx?894r. http://www.tax.alaska.gov/programs/documentviewer/viewer.aspx?1022r. http://www.tax.alaska.gov/programs/documentviewer/viewer.aspx?896r.

Oil and Gas Exploration

This analysis identified four separate oil and gas exploration companies operating in Federal offshore waters of the proposed Arctic ringed seal CHD. All four of these companies exceed the maximum size criterion for small entity status established by SBA for entities in this industry.

Support Activities for Oil and Gas Operations

Various businesses engage in oil and gas support activities that may require consideration of CH in ESA section 7 consultations, as evident by the companies listed in **Table 5-13** of the RIR. With respect to potential effects of the proposed action on small businesses engaged in support activities for oil and gas operations, all of the companies identified in **Table 5-13** exceed the SBA maximum size criterion for small entity status in this industry.

Transportation / Government Jurisdictions

One of three ports, Delong Mountain Terminal exceeds the size criterion for small entity status. It is operated by the State of Alaska, which serves a population greater than 50,000, and therefore is a large entity for RFA analysis purposes. The other two ports potentially affected indirectly by the Proposed Action, the Port of Nome and the Port of Kotzebue, are owned by entities serving a population of fewer than 50,000 people, and therefore these port owners are considered small governmental jurisdictions for RFA analysis purposes. Within a 10-year analytical timeframe, the Port of Kotzebue is not anticipated to bear any costs, while the Port of Nome may bear third-party costs of up to $4,000 associated with consultation for maintenance dredging of the Nome Harbor.

10.1.6 Identification of all Relevant Federal Rules which May Duplicate, Overlap, or Conflict with the Proposed Rule

NMFS has identified no such Federal rules.

10.1.7 Description and Analysis of Significant Alternatives to the Proposed Action

After careful examination of the best available scientific data on the physical and biological features essential to the conservation of the Arctic ringed seal, specific areas that may qualify as critical habitat for the Arctic ringed seal, and the impacts associated with the proposed designation, it is NMFS's determination that only the "proposed action" has the potential to accomplish the stated objectives and legal mandates associated with CHD for this species.

Retention of the "no action" alternative is not a viable choice for several reasons. Retention of the status quo would not be consistent with the objectives identified by the agency for this action (see the 'Purpose and Need' discussion in the RIR). In addition, adoption of the no action alternative would be contrary to the agency's statutory obligations under the ESA. Finally, because the proposed action does not have the potential to have a significant adverse economic impact on a substantial number of small entities, the status quo/no action alternative cannot result in a smaller burden, and could conceivably impose a greater burden, if selected (i.e., would not "minimize adverse impacts" as required under the RFA).

10.2 Statements of Energy Effects

Pursuant to EO No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal agencies must prepare and submit a "Statement of Energy Effects" for all "significant energy actions." The purpose of this requirement is to ensure that all

Federal agencies "appropriately weigh and consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy."[243]

The OMB provides guidance for implementing this EO, outlining nine outcomes that may constitute "a significant adverse effect" when compared with the regulatory action under consideration:

> Reductions in crude oil supply in excess of 10,000 bpd (bbls);

> Reductions in fuel production in excess of 4,000 (bbls);

> Reductions in coal production in excess of 5 million tons per year;

> Reductions in natural gas production in excess of 25 million Mcf per year;

> Reductions in electricity production in excess of 1 billion kilowatts-hours per year or in excess of 500 megawatts of installed capacity;

> Increases in energy use required by the regulatory action that exceed the thresholds above;

> Increases in the cost of energy production in excess of one percent;

> Increases in the cost of energy distribution in excess of one percent; or

> Other similarly adverse outcomes.[244]

10.2.1 Oil and Natural Gas Production

The proposed critical habitat designation overlaps with five BOEM planning areas for Outer Continental Shelf oil and gas leasing; however, the Beaufort and Chukchi Sea planning areas are the only areas with existing or planned leases. Currently, the majority of oil and gas production occurs on land adjacent to the Beaufort Sea and the proposed critical habitat area.

Any proposed offshore oil and gas projects likely would have to undergo ESA section 7 consultations to ensure that the actions are not likely to destroy or adversely modify designated critical habitat. As discussed in **Section 6** of the RIR for this proposed action, it is unlikely that CHD will result in additional project modification recommendations above and beyond those that may be required related to the Arctic ringed seal's listing as threatened. Incremental impacts to the energy industry directly attributable to CHD would most likely be limited to additional administrative costs of addressing CH in ESA Section 7 consultations. ESA section 7 consultations have occurred for numerous oil and gas projects within the area of the proposed CH (e.g., relative to possible effects on endangered bowhead whales, a species without designated critical habitat) without adversely affecting energy supply, distribution, or use, and the same is expected relative to CH for Arctic ringed seals. As a recent specific example, according to the USFWS, prior to vacature of the polar bear CHD, no consultations on activities within polar bear CH resulted in project modifications that were additional to those required to protect the species, and there were no time delays associated with addressing CH in new consultations. Therefore, CHD for the Arctic ringed seal is not expected to significantly affect oil and gas production decisions, subsequent oil and gas supply, or the cost of energy production.

[243] Office of Management and Budget. 2001. Memorandum for Heads of Executive Department Agencies and Independent Regulatory Agencies. *Guidance for Implementing E.O. 13211, M-01-27.* Website: http://www.whitehouse.gov/omb/memoranda/m01-27.html. Accessed July 31, 2001.

[244] Ibid.

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16 U.S.C. §1536.

5 AAC 01.005.

5 AAC 01.180.

20 AAC 25.005.

20 AAC 25.030.

20 AAC 25.535.

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