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

MAR 4 2011

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act (NEPA), an environmental review has been performed on the following action.

TITLE: Polar Bear Capture-Recapture Program in the U.S. Chukchi Sea during March through May 2011

LOCATION: Offshore U.S. Chukchi Sea between Cape Lisburne and Shishmaref

SUMMARY: The National Marine Fisheries Service proposes to issue an Incidental Harassment Authorization (IHA) to the U.S. Fish and Wildlife Service for the taking, by Level B harassment, of small numbers of marine mammals, incidental to conducting a polar bear capture-recapture program in the U.S. Chukchi Sea from March through May 2011.

NMFS has prepared an Environmental Assessment (EA) titled "Issuance of an Incidental Harassment Authorization to the U.S. Fish and Wildlife Service for the Take of Marine Mammals by Harassment Incidental to a Polar Bear Capture-Recapture Program in the U.S. Chukchi Sea," and prepared an independent Finding of No Significant Impact (FONSI). NMFS has determined that the impact of conducting the polar bear capture-recapture program in the U.S. Chukchi Sea may result, at worst, in a temporary modification in behavior of small numbers of two species of marine mammals. Based on its review of the record, including the EA and FONSI, NMFS has determined that issuance of the IHA will not result in any significant direct, indirect, or cumulative impact to any element of the human environment. NMFS does not anticipate that take by injury (Level A harassment), serious injury, or death will occur; nor has NMFS authorized take by Level A harassment. NMFS has further determined that this activity will result in a negligible impact on the affected species or stocks and will not have an unmitigable adverse impact on the availability of affected species or stocks for taking for subsistence uses.

RESPONSIBLE OFFICIAL:

James H. Lecky
Director
Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
1315 East-West Highway, Room 13821
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(301) 713-2332

The environmental review process led us to conclude that this action will not have a significant effect on the human environment. Therefore, an environmental impact statement will not be prepared. A copy of the EA and FONSI prepared by NMFS is enclosed for your information.

Although NOAA is not soliciting comments on this EA or FONSI, we will consider any comments submitted that would assist us in preparing future NEPA documents.

Please submit any written comments to the responsible official named above.

Sincerely,

Paul N. Doremus, Ph.D.
NOAA NEPA Coordinator

Enclosures

Environmental Assessment
For the Issuance of an Incidental Harassment Authorization to the U.S. Fish and Wildlife Service for the Take of Marine Mammals by Harassment Incidental to Conducting a Polar Bear Capture-Recapture Program in the U.S. Chukchi Sea

March 2011

LEAD AGENCY:	USDOC, National Oceanic and Atmospheric Administration National Marine Fisheries Service Office of Protected Resources Silver Spring, Maryland
RESPONSIBLE OFFICIAL:	James H. Lecky, Director, Office of Protected Resources
FOR INFORMATION CONTACT:	Office of Protected Resources National Marine Fisheries Service 1315 East West Highway Silver Spring, MD 20910 (301) 713-2332
LOCATION:	U.S. Chukchi Sea
ABSTRACT:	The National Marine Fisheries Service proposes to issue an incidental harassment authorization to the U.S. Fish and Wildlife Service for the take of marine mammals, by Level B harassment, incidental to conducting a capture-recapture program of polar bears in the U.S. Chukchi Sea.

List of Acronyms, Abbreviations, and Initialisms

ADCCED	Alaska Department of Commerce, Community, and Economic Development
ADF&G	Alaska Department of Fish and Game
ANSC	Alaska Native Science Commission
AQCR	Air Quality Control Regions
ASRC	Arctic Slope Regional Corporation
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BP	BP Exploration Alaska Inc.
CBD	Center for Biological Diversity
CBS	Chukchi/Bering Seas (stock of polar bear)
CCG	Canadian Coast Guard
CFR	Code of Federal Regulations
CEQ	President's Council on Environmental Quality
CI	Confidence Interval
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
ft	foot/feet
FR	Federal Register
HZ	hertz
IHA	Incidental Harassment Authorization
in^3	cubic inch
ION	ION Geophysical
kg	kilogram
kHz	kilohertz
km	kilometer
km^2	square kilometer
lbs	pounds
m	meter
mi	mile
mi^2	square mile
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
N.	North
NAAQS	National Ambient Air Quality Standards
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council

NSB	North Slope Borough
NWAB	Northwest Arctic Borough
OCS	Outer Continental Shelf
OMB	Office of Management and Budget
OPR	Office of Protected Resources
POC	Plan of Cooperation
PSD	Prevention of Significant Deterioration
PTS	Permanent Threshold Shift
s	second
SBS	Southern Beaufort Sea (stock of polar bear)
TEK	Traditional Ecological Knowledge
TK	Traditional Knowledge
TTS	Temporary Threshold Shift
U.S.	United States
U.S.C.	United States Code
USCG	United States Coast Guard
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
Y-K Delta	Yukon-Kuskokwim Delta
yr	year

Chapter 1 PURPOSE AND NEED FOR ACTION

1.1 Proposed Action

Pursuant to the National Environmental Policy Act (NEPA), the National Marine Fisheries Service (NMFS), through this Environmental Assessment (EA), has analyzed the potential impacts to the human environment that may result from the issuance of an Incidental Harassment Authorization (IHA) pursuant to section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1361 *et seq.*) to the United States (U.S.) Fish and Wildlife Service (USFWS) for the harassment of marine mammals incidental to conducting a capture-recapture program of polar bears in the U.S. Chukchi Sea.

On November 16, 2010, NMFS received an application from the USFWS requesting authorization for the take[1], by Level B harassment only, of small numbers of two species of marine mammals incidental to conducting a capture-recapture program of polar bears in the U.S. Chukchi Sea between March and May 2011. This program is a continuation of surveys that began in 2008. After reviewing the USFWS' application for completeness and requirements under the MMPA, NMFS published a proposed IHA notice in the *Federal Register* on January 4, 2011 (76 Federal Register [FR] 330), which included a request for comments from the public for 30 days. NMFS' proposed action is to issue an IHA to the USFWS to take two species of marine mammals, by harassment, incidental to a capture-recapture program of polar bears. The species of marine mammals that would be authorized for taking are: ringed seals (*Phoca hispida*) and bearded seals (*Erignathus barbatus*).

1.2 Purpose and Need

The purpose and need of the proposed action is to ensure compliance with the MMPA and its implementing regulations in association with the USFWS' polar bear capture-recapture program in the Chukchi Sea. The MMPA prohibits takes of all marine mammals with certain exceptions.

In response to the receipt of an IHA application from the USFWS, NMFS proposes to issue an IHA pursuant to section 101(a)(5)(D) of the MMPA. The primary purpose of the IHA is to provide an exception to the take prohibitions under the MMPA to authorize "takes" by "Level B harassment" of marine mammals incidental to the proposed polar bear capture-recapture program in the U.S. Chukchi Sea by the USFWS. The need for the issuance of the IHA is related to NMFS' mandates under the MMPA. Specifically, the MMPA prohibits takes of marine mammals, with specific exceptions, including the incidental, but not intentional, taking of marine mammals, for periods of not more than one year, by U.S. citizens who engage in a specified activity (other than commercial fishing).

IHA issuance criteria require that activities authorized by an IHA have a negligible impact on the species or stock(s) and not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses. In addition, the IHA must set forth the permissible

[1] Take under the MMPA means to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal. 16 U.S.C. 1362(13).

methods of taking, other means of effecting the least practicable impact on the species or stock and its habitat, and requirements for the monitoring and reporting of such takings.

This EA is prepared in accordance with the NEPA of 1969 (42 U.S.C. 4321 *et seq.*) for the analysis of the potential environmental impacts as the result of NMFS' proposed issuance of the IHA to the USFWS.

1.3 Scoping Summary

The purpose of scoping is to identify the issues to be addressed and the significant issues related to the proposed action, as well as to identify and eliminate from detailed study the issues that are not significant or that have been covered by prior environmental reviews. An additional purpose of the scoping process is to identify the concerns of the affected public, Federal and State agencies, and Indian tribes.

The MMPA and its implementing regulations governing issuance of an IHA require that upon receipt of a valid and complete application for an IHA, NMFS publish a notice of receipt in the *Federal Register* (50 Code of Federal Regulations [CFR] §216.104(b)(1)). The notice summarizes the purpose of the requested IHA, includes a statement about what type of NEPA analysis is being considered, and invites interested parties to submit written comments concerning the application.

NOAA Administrative Order (NAO) 216-6 established agency procedures for complying with NEPA and the implementing regulations issued by the President's Council on Environmental Quality (CEQ). NAO 216-6 specifies that the issuance of an IHA under the MMPA is among a category of actions that require further environmental review and the preparation of NEPA documentation.

1.3.1 Comments on the MMPA Application

On January 4, 2011, NMFS published a notice of a proposed IHA for the USFWS' proposed polar bear capture-recapture program in the Chukchi Sea in the *Federal Register* (76 FR 330), which announced the availability of the USFWS' IHA application for public comment for 30 days. The public comment period for the proposed IHA afforded the public the opportunity to provide input on environmental impacts, many of which are highlighted in this EA. In addition, NMFS will post the final 2010 EA and Finding of No Significant Impact (assuming NMFS makes this finding) on the Internet at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications. A Draft EA was not available for public comment at the time the application was out for public comment, as one had not been written at that time.

During the public comment period, NMFS received written comments on the proposed IHA from the Marine Mammal Commission. No comments were received from the general public. None of the comment letters addressed issues related to the NEPA process for this action. All comments received on the proposed IHA will be addressed in the IHA notice of issuance or denial.

1.3.2 Issues within the Scope of this EA

The analyses contained in this EA provide decision-makers and the public with an evaluation of the potential environmental, social, and economic effects of a range of reasonable alternatives, including the proposed action (i.e., issuance of an IHA to the USFWS). The EA also includes an analysis of the potential cumulative impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions, particularly as they relate to marine resources (e.g., marine mammals, fish, etc.) and subsistence harvest activities. The IHA, if issued, would authorize the take of two marine mammal species, by Level B harassment only, incidental to the USFWS' capture-recapture program of polar bears in the U.S. Chukchi Sea between March and May 2011. The primary issue associated with the proposed action is the potential disturbance of ringed and bearded seals from the presence and noise produced by the helicopter or fixed-wing aircraft used to conduct the polar bear capture-recapture program.

1.4 Applicable Laws and Necessary Federal Permits, Licenses, and Entitlements

The Federal issuance of an IHA under the MMPA is subject to a number of Federal laws and regulations, State and local permits, licenses, approvals, consultation requirements, and Executive Orders (EOs). This section summarizes these requirements.

1.4.1 National Environmental Policy Act

NEPA establishes a nationwide policy and goal of environmental protection and provides legal authority for Federal agencies to carry out that policy (40 CFR §1500.1(a)). It requires Federal agencies to study and consider the environmental consequences of their actions and to use an interdisciplinary framework for environmental decision-making, which includes the consideration of environmental amenities and values (42 U.S.C. §4332(B)).

Issuance of an IHA is subject to environmental review under NEPA. NMFS may prepare an EA, an Environmental Impact Statement (EIS), or determine that the action is categorically excluded from further review. While NEPA does not dictate substantive requirements for an IHA, it requires consideration of environmental issues in Federal agency planning and decision-making. The procedural provisions outlining Federal agency responsibilities under NEPA are provided in the CEQ's implementing regulations (40 CFR Parts 1500-1508).

NOAA has, through NAO 216-6, established agency procedures for complying with NEPA and the implementing regulations issued by the CEQ. NAO 216-6 specifies that issuance of an IHA under the MMPA is among a category of actions that require further environmental review. When a proposed action has uncertain environmental impacts or unknown risks, establishes a precedent or decision in principle about future proposals, may result in cumulatively significant impacts, or may have an adverse effect upon endangered or threatened species or their habitats, preparation of an EA or EIS is required. This EA is prepared in accordance with NEPA, the CEQ's implementing regulations, and NAO 216-6.

1.4.2 Marine Mammal Protection Act

Section 101(a)(5)(D) of the MMPA (16 U.S.C. 1371(a)(5)(D)) directs the Secretary of Commerce (Secretary) to authorize, upon request, the incidental, but not intentional, taking by harassment of small numbers of marine mammals of a species or population stock, for periods of not more than one year, by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specific geographic region if certain findings are made and notice of a proposed authorization is provided to the public for review.

Authorization for incidental taking of small numbers of marine mammals shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses. The authorization must set forth the permissible methods of taking, other means of effecting the least practicable impact on the species or stock and its habitat, and requirements pertaining to the monitoring and reporting of such takings. NMFS has defined "negligible impact" in 50 CFR §216.103 as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." Additionally, NMFS has defined "unmitigable adverse impact" in 50 CFR §216.103 as:

> …an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the U.S. can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as:

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

Section 101(a)(5)(D) of the MMPA establishes a 45-day time limit for NMFS' review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of small numbers of marine mammals. Not later than 45 days after the close of the public comment period, if the Secretary makes the findings set forth in Section 101(a)(5)(D)(i) of the MMPA, the Secretary shall issue the authorization with appropriate conditions to meet the requirements of Section 101(a)(5)(D)(ii) of the MMPA.

NMFS has promulgated regulations to implement the permit provisions of the MMPA (50 CFR Part 216) and has produced Office of Management and Budget (OMB)-approved application instructions (OMB Number 0648-0151) that prescribe the procedures (including the form and manner) necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the MMPA. Applications for an IHA must be submitted according to regulations at 50 CFR §216.104.

1.4.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA; 16 U.S.C. §1536) and implementing regulations at 50 CFR Part 402 require consultation with the appropriate Federal agency (either NMFS or the USFWS) for Federal actions that "may affect" a listed species or critical habitat. NMFS' issuance of an IHA affecting ESA-listed species or designated critical habitat, directly or indirectly, is a Federal action subject to these section 7 consultation requirements. Accordingly, NMFS is required to ensure that its action is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of critical habitat for such species. Section 9 (16 U.S.C. §1538) of the ESA identifies prohibited acts related to endangered species and prohibits all persons, including all Federal, state and local governments, from taking listed species of fish and wildlife, except as specified under provisions for exemption (16 U.S.C. §§1535(g)(2) and 1539).

None of the species proposed for taking under the MMPA incidental to the USFWS' 2011 polar bear capture-recapture program are currently listed as threatened or endangered under the ESA. However, on December 10, 2010, NMFS published a notice of proposed threatened status for subspecies of the ringed seal (75 FR 77476) and a notice of proposed threatened and not warranted status for subspecies and distinct population segments of the bearded seal (75 FR 77496) in the *Federal Register*. The listing of these species under the ESA will not be complete prior to the USFWS' proposed action occurring in spring 2011. Therefore, a consultation pursuant to Section 7(a)(2) of the ESA is not required at this time.

Section 7(a)(4) of the ESA requires a conference on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under Section 4 of the ESA or result in the destruction or adverse modification of critical habitat proposed to be designated for such species. NMFS, Office of Protected Resources (OPR), Permits, Conservation and Education Division determined that the issuance of an IHA to the USFWS for the take of ringed and bearded seals incidental to the proposed polar bear capture-recapture program will not jeopardize the continued existence of either species because of the low level of impact that is anticipated (the potential impacts are discussed later in this EIS). Therefore, a conference was determined unnecessary.

1.4.4 Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Federal agencies are required to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency which may adversely affect essential fish habitat (EFH) identified under the MSFCMA. NMFS, OPR, Permits, Conservation and Education Division determined that issuance of an IHA to the USFWS for the proposed polar bear capture-recapture program in the U.S. Chukchi Sea would not have an adverse impact on EFH. Therefore, an EFH consultation is not required, and none was conducted.

1.4.5 Executive Order 12898: Environmental Justice

EO 12898, signed by the President on February 11, 1994, and published February 16, 1994 (59 FR 7629), requires that Federal agencies make achieving "environmental justice" part of their mission by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low income populations in the U.S. Many Alaska Natives harvest marine mammals for subsistence purposes and benefit from their continued existence. The potential effects of the proposed action on minority populations are described in Chapter 4.

1.4.6 Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

This EO, signed by the President on November 6, 2000, and published on November 9, 2000 (65 FR 67249), is intended to establish regular and meaningful consultation and collaboration between Federal agencies and Native tribal governments in the development of Federal regulatory practices that significantly or uniquely affect their communities. NMFS determined that the proposed issuance of an IHA to the USFWS to capture and study polar bears during the spring ice-covered period in the U.S. Chukchi Sea would not have a significant or unique effect on Native Alaskan communities in the project area.

1.5 Description of the Specified Activity

As described above, Section 101(a)(5)(D) of the MMPA requires that an applicant indicate the specified activity sought for authorization. The applicant's activity is evaluated by NMFS and informs NMFS' development of a proposed action and range of alternatives to be considered by NMFS in accordance with NEPA. The specified activity is summarized in this subsection and is also described in the USFWS' application for authorization pursuant to Section 101(a)(5)(D) of the MMPA, which is available on the Internet on the NMFS OPR website at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

1.5.1 Project Location

The USFWS polar bear captures happen on the sea ice in the U.S. Chukchi Sea. Captures occur on the sea ice up to 100 mi (161 km) offshore of the Alaskan coastline between Shishmaref and Cape Lisburne. Figure 1 depicts the U.S. Chukchi Sea coastline and shows the tracklines flown during USFWS polar bear captures conducted between mid-March and early May 2009 and 2010.

1.5.2 Project Description

In response to the need for information on the Chukchi-Bering Seas polar bear population, the USFWS initiated a capture-based research program starting in 2008 on the sea ice off the Chukchi Sea coastline. The USFWS scientists are trying to obtain information on bear health, body condition, movement patterns, habitat use, and demography. This work was initiated in response to the need for information to inform management (particularly the setting of harvest quotas) under the U.S.-Russia treaty that was implemented in 2008, identify appropriate mitigation for oil and gas exploration activities in the Chukchi Sea lease sale area, and the need to better monitor this population due to the listing of polar bears as "threatened" under the ESA

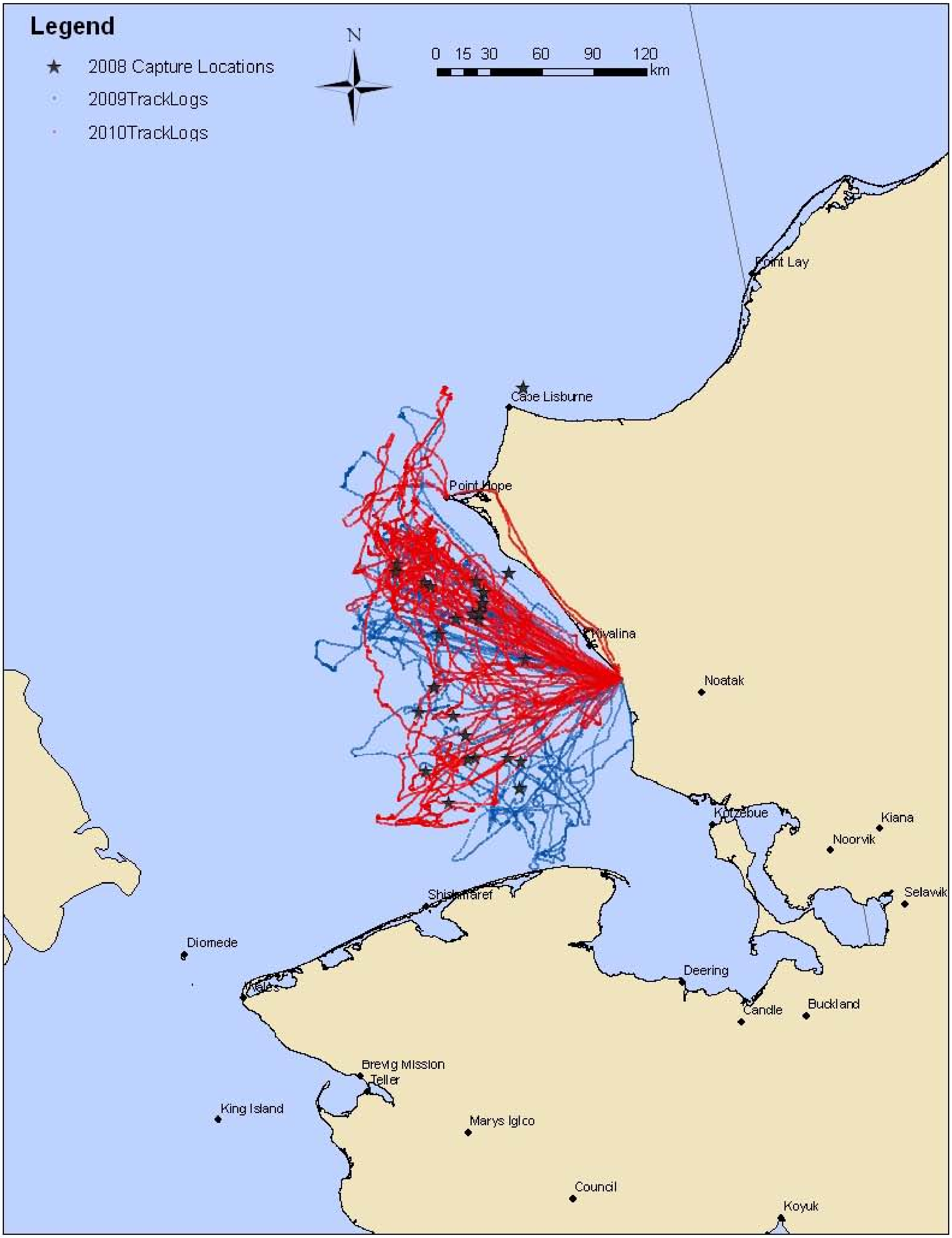

Figure 1. U.S. Chukchi Sea coastline and flight paths during polar bear capture operations conducted mid-March through early May in 2009 and 2010.

on May 15, 2008 (73 FR 28212). To date there has never been an estimate of the size or status (e.g. increasing, decreasing, or stable) of this population, and minimal research has been conducted to understand the population's status or response to declining sea ice habitat. Estimates of human-caused removal for this polar bear population are high (100-200/yr in Russia and 30/yr in the U.S.), and sea ice loss has occurred at one of the highest rates in the circumpolar arctic. There is concern over the current status of this population due to these threats.

Each spring, the USFWS conducts a 6-8 week period of polar bear captures on the sea ice off the U.S. Chukchi Sea coastline. A fixed wing and a Bell 206 Long-ranger helicopter are flown 300 ft (91.4 m) above the sea ice to track and locate polar bears for capture. The flyover area to locate polar bears includes ice seal habitat, and ice seals are frequently encountered hauled out on the sea ice at breathing holes or cracks. To capture polar bears, the aircraft flies immediately over the target bear for several minutes to administer a dart. Capture locations are carefully chosen for the safety of the bear and never include areas where ice seals occur. With the exception of habitats near the USFWS' base location on the coast, flights rarely occur repeatedly over the same areas. The USFWS monitor the prior week's tracklogs to ensure that they continue to search new habitat each day.

Polar bear capture operations would occur daily, as weather permits, between mid-March and the first week of May 2011. The program may continue through the middle or end of May if there is bad weather or other unforeseen delays. During a typical capture season over the past 3 years, this has resulted in 28-30 flight days and less than 200 flight hours per season.

Chapter 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

The NEPA implementing regulations (40 CFR §1502.14) and NAO 216-6 provide guidance on the consideration of alternatives to a Federal proposed action and require rigorous exploration and objective evaluation of all reasonable alternatives. Alternatives must be consistent with the purpose and need of the action and be feasible. This chapter describes the range of potential action (alternatives) determined reasonable with respect to achieving the stated objective, as well as alternatives eliminated from detailed study, and also summarizes the expected outputs and any related mitigation of each alternative.

In light of NMFS' stated purpose and need, NMFS considered the following two alternatives for the issuance of an IHA to the USFWS for the taking of marine mammals incidental to conducting their polar bear capture-recapture program during the spring ice-covered period in 2011.

2.1 Alternative 1—No Action Alternative

Under the No Action Alternative, NMFS would not issue an IHA to the USFWS for the potential harassment of marine mammals incidental to conducting a polar bear capture-recapture program off the U.S. Chukchi Sea coast. The MMPA prohibits all takings of marine mammals unless authorized by a permit or exemption under the MMPA. The consequences of not authorizing incidental takes are (1) the entity conducting the activity may be in violation of the MMPA if takes do occur, (2) mitigation and monitoring measures cannot be required by NMFS, and (3) mitigation measures might not be performed voluntarily by the applicant. By undertaking measures to further protect marine mammals from incidental take through the authorization program, the impacts of these activities on the marine environment can potentially be lessened. While NMFS does not authorize the polar bear capture-recapture program itself (that authority falls to the USFWS), NMFS does authorize the unintentional, incidental harassment of marine mammals (under its jurisdiction) in connection with these activities and prescribes the methods of taking and other means of effecting the least practicable impact on the species and stocks and their habitats. If an IHA is not issued, the USFWS could decide either to discontinue the research activities or to continue the activities described in section 1.5 of this EA. If the latter decision is made, the USFWS could presumably, independently implement (presently unidentified) mitigation measures; however, they would be proceeding without authorization from NMFS pursuant to the MMPA. If the USFWS did not implement mitigation measures during polar bear capture activities, takes of marine mammals by harassment (and potentially by injury or mortality) could occur if the activities were conducted when marine mammals, other than polar bears which are the target of the program, were present. Although the No Action Alternative would not meet the purpose and need to allow incidental takings of marine mammals under certain conditions, the CEQ's regulations require consideration and analysis of a No Action Alternative for the purposes of presenting a comparative analysis to the action alternatives.

2.2 Alternative 2—Issuance of an IHA with Required Mitigation, Monitoring, and Reporting Requirements (Preferred Alternative)

Under this alternative, NMFS would issue an IHA under Section 101(a)(5)(D) of the MMPA to the USFWS, allowing the take, by Level B harassment only, of small numbers of marine mammal species incidental to conducting a polar bear capture-recapture program off the U.S. Chukchi Sea coast from March through May 2011. In order to reduce the incidental harassment of marine mammals to the lowest level practicable, the USFWS would be required to implement the mitigation, monitoring, and reporting measures described in Chapters 5 and 6 of this EA. For authorizations in Arctic waters, NMFS must also prescribe measures to ensure that there is no unmitigable adverse impact on the availability of the affected species or stock for taking for subsistence uses. The impacts to marine mammals and subsistence hunters that could be anticipated from implementing this alternative are addressed in Chapter 4 of this EA. Measures to reduce impacts to subsistence users are discussed in Chapter 5 of this EA. Since the MMPA requires holders of IHAs to reduce impacts on marine mammals to the lowest level practicable, implementation of this alternative would meet NMFS' purpose and need as described in this EA.

2.3 Alternatives Considered but Eliminated from Further Consideration

NMFS considered whether other alternatives could meet NMFS' purpose and need and support the USFWS' proposed polar bear research program. An alternative that would allow for the issuance of an IHA with no required mitigation was considered but eliminated from consideration, as it would not be in compliance with the MMPA and therefore would not meet the purpose and need identified in this EA. For that reason, this alternative is not analyzed further in this document.

Chapter 3 AFFECTED ENVIRONMENT

The purpose of this chapter is to provide baseline information for consideration of the alternatives and to describe the environment that might be affected by the proposed action and alternatives. This chapter describes the affected environment relative to physical, biological, and socio-cultural resources found in the proposed 2011 proposed polar bear capture-recapture project area described by the USFWS. The Chukchi Sea environment is covered by the arctic ice pack 7–10 months each year but supports a diverse biological ecosystem driven primarily by the seasonal presence of sea ice. The ice pack shapes the habitat for many of the biological organisms, from the primary productivity of the plankton communities to the migration patterns of the bowhead whale. The Arctic Ocean sea ice conditions are influenced by weather, wind, ocean currents, and extreme daylight conditions. The socio-cultural setting of the Chukchi Sea communities is closely intertwined with the biological resources and the ice conditions of the Arctic Ocean. The effects of the alternatives on the environment are discussed in Chapter 4 of this EA.

3.1 Physical Environment

The USFWS' proposed action area is in the U.S. Chukchi Sea from Cape Lisburne south to Shishmaref. The Chukchi Sea is part of the Arctic Ocean. During much of the year, the Arctic Ocean is covered with ice. Since the USFWS' proposed activity will occur during the ice-covered season in the Chukchi Sea, the discussion of the physical environment will focus mostly on sea ice instead of the water column, as the proposed action is not anticipated to have any impacts on the water column or seabed or on water quality in the proposed action area.

3.1.1 Geology and Oceanography

Two shoals, the Hanna and Herald, are within the Chukchi Sea. These shoals rise above the surrounding seafloor to approximately 20 m (66 ft) below sea level. There are two major canyons—Herald Canyon and Barrow Canyon. The Barrow Sea Valley begins north of Wainwright and trends in a northeasterly direction parallel to the Alaskan coast. Herald Valley is to the north. Hope Valley, a broad depression, stretches from the Bering Strait to Herald Canyon. These topographic features exert a steering effect on the circulation patterns in this area.

The generalized circulation within the Chukchi Sea is influenced primarily by the Arctic circulation driven by large-scale atmospheric pressure fields. Cyclonic (counterclockwise) winds centered over the central Arctic Ocean predominate, alternating with anticyclonic (clockwise) winds for 5- to 7-year periods. In the Chukchi Sea, three branches of North Pacific waters move across the shelf in a northward direction. This mean flow is primarily a product of the sea-level slope between the Pacific and the Arctic oceans. The first of these currents, the Alaska Coastal Current, flows northeastward along the Chukchi Sea coast of Alaska at approximately 4 cm/s (Coachman, 1993; Johnson, 1989; Weingartner et al., 1998). The other waters moving north are the Bering Sea-shelf water and the Gulf of Anadyr water. These move into the Arctic Basin through Herald Valley and around Hanna Shoal (found in the northeastern portion of the Chukchi Sea).

Tides are small in the Chukchi Sea, and the range generally is less than 30 cm (11.8 in). Tidal currents are largest on the western side of the Chukchi and near Wrangel Island, ranging up to 5 cm/s (2 in/s; Woodgate et al., 2005). Waves in the Chukchi Sea are controlled by wind and the amount of ice in the water, as ice dampens waves. With a solid ice cover, no waves are generated. Under heavy ice-cover conditions during the colder months, there is little wave development. When the ice thins out, particularly during late summer, the available open-water surface increases, and the waves grow in height. Typical wave heights are less than 1.5 m (4.9 ft), with a wave period of approximately 6 s during summer and less than 2.5 m (8.2 ft) during fall. Expected maximum wave heights are 8-9.5 m (26.2-31.2 ft) in the Chukchi Sea (Brower et al., 1988). A late summer storm in the Beaufort and Chukchi seas in September, 2000, developed waves 6-7 m (19.7-23 ft) high at Point Barrow (Lynch et al., 2003).

3.1.2 Sea Ice

Sea ice is frozen water with the salt extruded out of the ice mass. The northern Alaskan coastal waters are covered by sea ice for three-quarters of the year, from approximately October until June. Sea ice has a large seasonal cycle, reaching a maximum extent in March and a minimum in September. The formation of sea ice has important influences on the transfer of energy and matter between the ocean and atmosphere. It insulates the ocean from the freezing air and the blowing wind.

There are three major forms of sea ice in the Arctic: landfast ice (which is attached to the shore, is relatively immobile, and extends to variable distances offshore); stamukhi ice (which is grounded, ridged sea ice); and pack ice (which includes first-year and multiyear ice and moves under the influence of winds and currents).

While there are wide-ranging spatial and temporal variations in arctic sea ice, the generalized annual patterns are as follows:

- September – Shore ice forms; the river deltas freeze; and frazil, brash, and greased ice form within bays and near the coast;
- Mid-October – Smooth, first-year ice forms within bays and near the coast. Thomas Napageak remarked: "…The critical months [for ice formation] are October, November, and December" (Napageak cited in Dames and Moore, 1996:7);
- November through May – Sea ice covers more than 97% of the areas. Spring leads form in the Chukchi Sea;
- Late May – Rivers flood over the nearshore sea ice; and
- Early June – River floodwaters drain from the surface of the sea ice. Sarah Kunaknana stated: "In June and July when the ice is rotting in the little bays along the coast…." (Kunaknana cited in Shapiro and Metzner, 1979).

The southern Chukchi Sea is free of sea ice 1-2 months longer each year than the northern Chukchi Sea. Warmer water flowing north through the Bering Strait, combined with strong sunlight returning earlier in the year at lower latitudes, melts or pushes the pack ice north starting as early as mid-June. The same effect keeps the surface ice free longer in the fall, typically until mid-November.

The extent of arctic sea ice (the area of ocean covered by ice), as observed mainly by satellite, has decreased at a rate of about 3% per decade since the 1970s (Parkinson et al., 1999; Johannessen et al., 1999). Within Canadian Arctic waters, a similar rate of decrease has been observed over the period 1969-2000. In recent years, satellite data have shown a further reduction in ice cover. In September, 2002, sea ice in the Arctic reached a record minimum, 4% lower than any previous September since 1978 and 14% lower than the 1978-2000 mean (Serreze et al., 2003). Three years of low ice followed 2002. Taking these 3 years into account, the September ice-extent trend for 1979-2004 is declining by 7.7% per decade (Stroeve et al., 2005).

Changes in the landfast ice have been occurring. Events of shorefast ice breaking off have occurred near Barrow in January or February and even as late as March (George et al., 2003). These events also have increased in frequency.

There have also been changes in the amount and distribution in the age class of ice in the Arctic. An overall trend shows reduction in multiyear ice and an increase in first and second year ice. A recent analysis indicates that the replacement of multiyear ice at the end of summer 2005 was close to zero (Kwok, 2007). Another report noted a substantial loss of old ice (ice greater than 10 years old) in the western Arctic at a rate of 4.2% annually and an increase in the amount of young ice through 2003 (Belchansky et al., 2005). The greatest decreases in multiyear ice concentrations (3.3% per year) occurred in the southern Beaufort and Chukchi Seas (Belchansky et al., 2004). There are two main hypotheses for these multiyear ice losses: (1) the clearing factor through the transpolar drift out of the Arctic (Rigor and Wallace, 2004); and (2) there has been an overall rise in arctic temperatures (Rothrock and Zhang, 2005; Lindsay and Zhang, 2005; Francis et al., 2005).

3.1.3 Air Quality

The combination of limited industrial development and low population density results in good to excellent air quality throughout the Chukchi Sea and U.S. Arctic Ocean as a whole. Only a few small, scattered emissions from widely scattered sources exist on the adjacent onshore areas. The only major local sources of industrial emissions are in the Prudhoe Bay/Kuparuk/Endicott oil-production complex in the Beaufort Sea, which is far north of the USFWS' proposed project area. During the winter and spring, additional pollutants are transported by the wind to the Alaska Arctic Ocean from industrial sources in Europe and Asia (Rahn, 1982). These pollutants cause a phenomenon known as arctic haze.

The U.S. Environmental Protection Agency defines Air Quality Control Regions (AQCR's) for all areas of the U.S. and classifies them based on six "criteria pollutants," and has established for each of them a maximum concentration above which adverse effects on human health may occur. The six criteria pollutants are: (1) carbon monoxide; (2) nitrogen dioxide; (3) small-diameter particulate matter; (4) sulfur dioxide; (5) ozone; and (6) lead. These threshold concentrations are called National Ambient Air Quality Standards (NAAQS). When an area meets NAAQS, it is designated as an "attainment area." An area not meeting air quality standards for one of the criteria pollutants is designated as a "nonattainment area." Areas are designated as "unclassified" when insufficient information is available to classify areas as attainment or nonattainment. All areas in and around the U.S. Arctic Ocean (i.e., Chukchi and Beaufort Seas) are classified as attainment areas.

The provisions of Alaska's Prevention of Significant Deterioration (PSD) program are applied to attainment areas and unclassified AQCR's with good air quality to limit their degradation from development activities. The areas are classified as PSD Class I, II, or III areas (in decreasing order of relative protection) based on land status/use and the associated protection afforded to the area. The region of Alaska adjacent to the Chukchi and Beaufort seas is a PSD Class II area. The nearest PSD Class I areas are the Bering Sea Wilderness Area within the St. Matthew Island group and the Denali National Park (both are far to the south of the proposed action area in this EA). There are no Class III areas in Alaska. States strive to allow industrial and commercial growth within PSD Class II areas without causing significant degradation of existing air quality or exceeding the NAAQS (MMS, 2006).

3.2 Biological Environment

The Chukchi Sea supports a diverse assemblage of marine species: lower trophic organisms; marine fishes; marine birds; and marine mammals. Because the USFWS' proposed polar bear capture-recapture program would occur during the ice-covered season from a helicopter or fixed-wing aircraft flying over the ice and landing on the ice for only short periods of time, this action is not anticipated to have any impacts on lower trophic organisms or marine fishes. Therefore, these resources are not discussed further in this EA. Additionally, the area where the USFWS' activities would occur does not contain any park land, prime farmlands, wetlands, wild and scenic rivers, or critical habitat, or districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places. The most southern point of the spectacled eider Ledyard Bay critical habitat area starts at Cape Lisburne (Figure 2), which is the most northern point of the USFWS' proposed project area. However, flights are not anticipated to occur north of Cape Lisburne into the spectacled eider Ledyard Bay critical habitat area.

3.2.1 Marine Birds

Although NMFS does not expect marine birds would be directly affected from the proposed action (issuing an IHA to the USFWS for a polar bear capture-recapture program in the Chukchi Sea), they could be indirectly affected by the USFWS aircraft flights during the program. Therefore, as part of the environmental analysis, the baseline information on marine birds that could potentially occur in the proposed action area is provided here as part of the affected environment.

3.2.1.1 Threatened and Endangered Marine Birds

Spectacled Eider (*Somateria fischeri*)
All spectacled eider populations were listed as a threatened species under the ESA in May 1993. Listing was due to an estimated 96% decrease in nesting abundance in the Yukon-Kuskokwim Delta (Y-K Delta) from the 1970s to the early 1990s and uncertainty about the trends in nesting abundance on the arctic coastal plains in Alaska and Russia. The breeding population on the North Slope currently is the largest breeding population of spectacled eiders in North America. An estimated 4,744 pairs (± 907 pairs, average ± 2 standard errors of the sample) of spectacled eiders breed on the Arctic Coastal Plain of Alaska (MMS, 2006). This breeding population represents about 2-3% of the estimated world population of 363,000 spectacled eiders (USFWS,

1999). Other major breeding populations are in the Y-K Delta and the Arctic Coastal Plain of Russia. The non-breeding segment of any of the populations is unknown. Based on survey data, the spectacled eider breeding population on the North Slope has not shown a significant decline throughout most of the 1990s.

During the winter months of October-March, spectacled eiders are found far offshore in waters up to 65 m (213 ft) deep, where they sometimes gather in dense flocks in openings of nearly continuous sea ice. Around the time of spring break-up, breeding pairs move to nesting areas on wet coastal tundra. They establish nests near shallow ponds or lakes, usually within 3 m (10 ft) of water. During this season they feed by diving and dabbling in ponds and wetlands, eating aquatic insects, crustaceans, and vegetation.

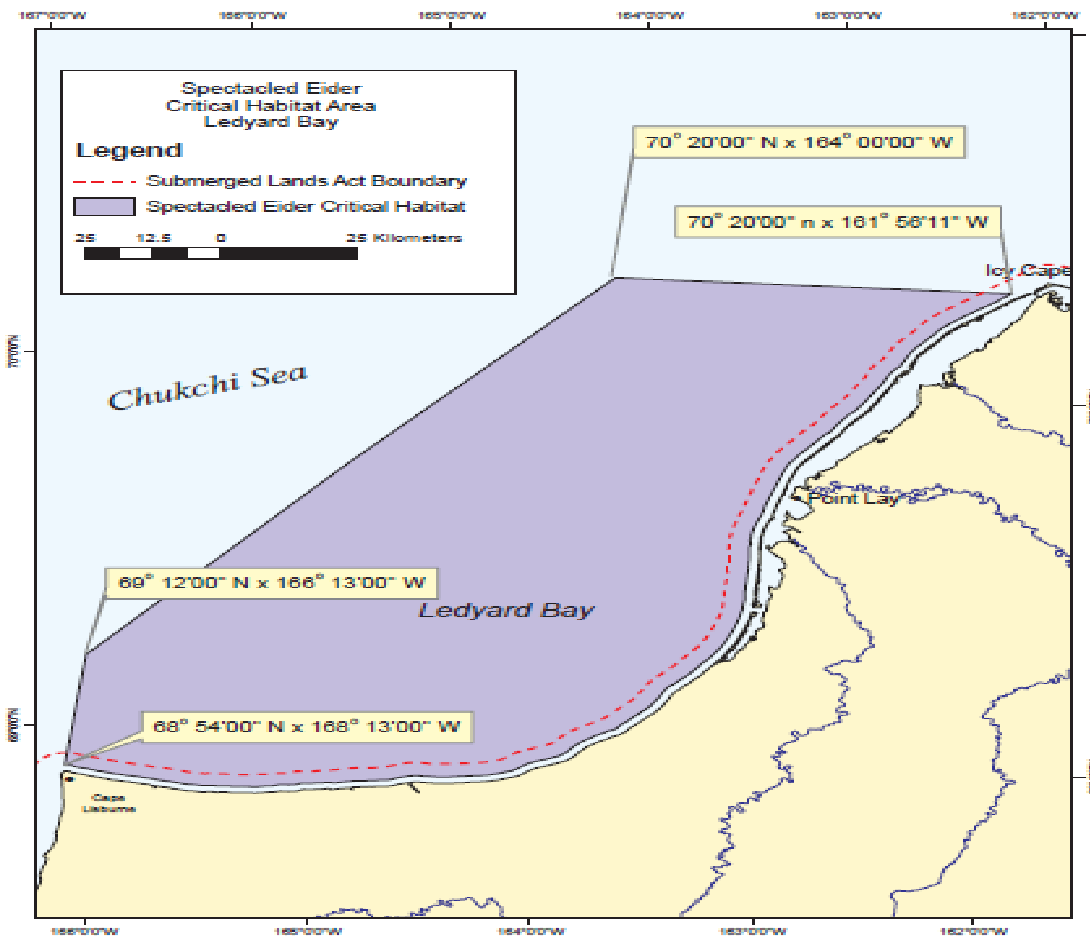

Figure 2. Location of Ledyard Bay spectacled eider critical habitat (MMS, 2008).

Kittlitz's Murrelet (*Brachyramphus brevirostris*)
This bird is listed as a candidate species throughout Alaska under the ESA. This species may nest as far north as Cape Beaufort (100 km [62 mi] northeast of Cape Lisburne) in the Amatusuk Hills. Thompson et al. (1966) observed a nest several miles inland on the Lisburne Peninsula northeast of Cape Thompson near Angmakrok Mountain. Breeding farther north is unlikely due to lack of suitable habitat (Day et al., 1999). The Lisburne Peninsula has not been searched for Kittlitz's murrelets since 1983. These birds are solitary nesters and extensive survey effort is

required to determine local abundance. Due to limited survey efforts, the size of the Kittlitz's murrelet breeding population in the Lisburne Peninsula area remains uncertain.

Foraging areas may occur in the action area. Kittlitz's murrelets have been observed on a regular basis as far north as Point Barrow (Bailey, 1948). Regular observations of Kittlitz's murrelets at sea were noted in late summer and early fall by Divoky (1987), but they have not been subsequently observed by others on similar cruises in the Chukchi Sea, suggesting that there is a great deal of annual variation in their occurrence in the Chukchi Sea. Kittlitz's murrelets are uncommon in the proposed action area during the spring months of March-May (USFWS, 2006).

Yellowbilled Loon (*Gavia adamsii*)
Due to concerns about subsistence harvest levels and low range-wide population levels, the yellowbilled loon was designated as a candidate species for protection under the ESA on March 25, 2009. The breeding range of the yellow-billed loon stretches from Hudson Bay in Canada to the Pechora River Delta in western Russia. The furthest south that the species is known to breed is on St. Lawrence Island in the Bering Sea (Earnst, 2004; USFWS, 2009a). The U.S. breeding population is distributed throughout the National Petroleum Reserve-Alaska. Yellow-billed loons are largely associated with large, deep, tundra lakes during the breeding season (Johnson and Herter 1989). Their distribution is clumped at larger scales with low densities overall due to the patchiness of their preferred habitat (USFWS, 2009a). Aerial surveys conducted by the USFWS have reported that, after fledging, the nearshore areas along the Chukchi Sea are important to the species (Fischer et al., 2002; Lysne et al., 2004). The majority of observations of yellow-billed loons have been made between Barrow and Peard Bay. Wintering grounds are pelagic marine waters in south-central and southeast Alaska through British Columbia and in Eurasia off the coast of Norway, Kamchatka Peninsula, Japan, North Korea, and China (Earnst, 2004). Telemetry data reported by Schmutz (2009) indicate that a large proportion of the yellow-billed loons from the North Slope winter in North Korea, Japan, and China. To reach their wintering ground it was found that individuals stayed within 12 km (20 mi) of the coast. Nonbreeders remain in coastal marine waters throughout the year (USFWS, 2009a). These birds migrate northward through the Kotzebue Sound and Cape Lisburne area from about April-June. Yellow-billed loons depart the summer breeding grounds in late August or mid-September (Johnson and Herter, 1989).

3.2.1.2 Other Marine Birds

Most marine birds are present in the Chukchi Sea on a seasonal basis. Arrival times usually coincide with the formation of leads during spring migration to coastal breeding areas. Many seabirds (e.g., murres) and sea ducks (e.g., common eiders and long-tailed ducks) will closely follow leads during spring migration. Migration times vary by species; however, spring migration for most species occurs primarily between late March and late May (during the timeframe of the proposed activity).

Cliff-nesting Seabirds
Murres: Common murres (*Uria aalge*) and thick-billed murres (*U. lomvia*) breed as far north as Cape Lisburne. Murres breed on cliffs and colonies and often are intermingled. Approximately 100,000 murres nest at Cape Lisburne, of which about 70,000 were common murres (USFWS, 2005 cited in MMS, 2006). Farther south at Cape Thompson, there are about 390,000 nesting

murres, of which 75% are thick-billed murres (Fadely et al., 1989 cited in MMS, 2006). Long-term monitoring at Cape Thompson indicates an approximate 50% decline in murre numbers (species combined) since 1960, whereas the colony at Cape Lisburne more than doubled between 1976 and 1995 (Fadely et al., 1989; Roseneau, 1996).

In the winter months, murres are typically found at sea, south of the ice edge. During the spring period of March-May, they are common in the proposed project area (USFWS, 2006). Cape Lisburne is a common breeding area for both common and thick-billed murres (USFWS, 2006).

Puffins: Horned puffins (*Fratercula corniculata*) are the most abundant puffin species in the Chukchi Sea, where around 18,000 breed at colonies at Cape Lisburne and Cape Thompson (Sowls et al., 1978). There are about 100 breeding tufted puffins (*F. cirrhata*) in the same area (Sowls et al., 1978). Small numbers of tufted puffins breed at small colonies between Cape Thompson and Cape Lisburne. The offshore distance traveled during foraging trips by horned puffins breeding at colonies in the Chukchi Sea is unknown, but trips in excess of 100 km (60 mi) have been reported from horned puffins in other areas of Alaska, although the breeding status of the satellite-tagged birds was not confirmed (Hatch et al., 2000). Horned puffins have been seen near Barrow and have started to breed on Cooper Island in the western Beaufort Sea in recent years (Friends of Cooper Island, 2005). Because horned puffins are not obligate cliff nesters, they can breed on suitable beach habitat on islands nearshore by digging burrows or hiding under large pieces of driftwood or debris. Given their primarily fish-based diet and patchy nature of prey items, it is possible that horned puffins have a range similar to murres, although the degree to which the foraging areas overlap is unknown. Numbers of horned puffins in the Chukchi Sea were greatest in the vicinity of Cape Lisburne after the breeding season in September.

Black-legged Kittiwake (*Rissa tridactyla*)**:** Approximately 48,000 black-legged kittiwakes breed along the Chukchi Sea coast between Cape Thompson to Cape Lisburne (USFWS, 2005 cited in MMS, 2006). These data are more than 25 years old, and the current status of the population is unknown. The center of the North Pacific breeding range for black-legged kittiwakes is in the Gulf of Alaska and the Bering Sea (Sowls et al., 1978); therefore, breeding colonies in the Chukchi Sea are at the northern limit of their breeding range in Alaska. This species is common in the proposed action area during the spring months of March-May (USFWS, 2006). Black-legged kittiwakes are common in the Chukchi Sea north of Cape Thompson from mid-July until late September, where they range far offshore (Divoky, 1987).

Bering Sea Breeders

Short-tailed Shearwaters (*Puffinus tenuirostris*)**:** These birds breed in the southern hemisphere. In the northern hemisphere, short-tailed shearwaters are found primarily in the Bering Sea, where the population was estimated between 20 and 30 million in 1981 by Hunt et al. (1981). Short-tailed shearwaters in the Chukchi Sea are most common in the southern portion, which is in the proposed action area. Short-tailed shearwaters have been reported as far north as Barrow (71° N. latitude) and beyond (Divoky, 1987), depending on the presence of sea ice. Short-tailed shearwaters are most common in the southern Chukchi Sea starting around May (USFWS, 2006).

Auklets: Parakeet (*Cyclorrhynchus psittacula*), least (*Aethia pusilla*), and crested (*A. cristatella*) auklets breed as far north as the Bering Strait (Sowls et al., 1978) but move north into the Chukchi Sea, typically in late spring or summer. Based on limited data, crested auklets appear to be the most numerous auklet species in the Chukchi Sea during this period. In 1986, an anomalous year due to a large intrusion of Bering Sea water into the Chukchi Sea that likely affected zooplankton availability, crested auklets were abundant in the Chukchi Sea from late August until early October, probably numbering well over 100,000 (Divoky, 1987). The distribution in other years is probably less uniform with fewer birds, perhaps 100,000 auklets when combining the three species.

Waterfowl

Common Eider (*Somateria mollissima*)**:** From about April-May, common eiders start to leave their overwintering grounds in the Bering Sea and begin migrating through the southern portion of the Chukchi Sea (through the proposed action area). Beginning in late June, male common eiders begin moving towards molting areas in the Chukchi Sea. Common molt areas in Alaskan waters in the Chukchi Sea are near Point Lay, Icy Cape, and Cape Lisburne (Johnson and Herter, 1989). Most breeding female common eiders and their young begin to migrate to molt locations in late August and September, although large numbers of female common eiders were observed molting in the eastern Beaufort Sea in Canada near Cape Parry and Cape Bathurst (Johnson and Herter, 1989). In July and August, most common eiders in the Chukchi Sea are molting males. When traveling along the northwest coast of Alaska, these eiders tend to stay along the 20-m (66-ft) isobath, approximately 45 km (28 mi) from shore. After the molt is completed, some common eiders move offshore into pelagic waters, but the majority of eiders remain close to shore (Divoky, 1987). Adult female breeders migrate to molt locations in late August and September.

King Eider (*Somateria spectabilis*)**:** Phillips (2005), using satellite telemetry, determined that most king eiders spent more than 2 weeks staging offshore in the Beaufort Sea prior to migrating to molt locations in the Bering Sea. Although king eiders migrate through the Chukchi Sea, specific observations on their movements are poorly understood. Divoky (1987) characterized the movements of all three species of Somateria as typically migrating offshore along the 20-m (66-ft) isobath until late September, when they become more common in pelagic waters. King eiders may migrate through the proposed action area in the spring months of April and May.

3.2.2 Marine Mammals

The Chukchi Sea supports a diverse assemblage of marine mammals, including: bowhead, gray, beluga, killer, minke, humpback, and fin whales; harbor porpoise; ringed, ribbon, spotted, and bearded seals; narwhals; polar bears; and walruses. However, many of these species do not occur in the proposed action area during the proposed activity timeframe. The marine mammal species most likely to be found in the proposed action area between mid-March and early to mid-May are ringed and bearded seals and polar bears. Therefore, these other marine mammal species are not discussed further in this EA.

3.2.2.1 Ringed Seal

Distribution: Ringed seals (*Phoca hispida*) have a circumpolar distribution from approximately 35°N to the North Pole, occurring in all seas of the Arctic Ocean (King, 1983). In the North Pacific, they are found in the southern Bering Sea and range as far south as the Seas of Okhotsk and Japan. Throughout their range, ringed seals have an affinity for ice-covered waters and are well adapted to occupying seasonal and permanent ice. They tend to prefer large floes (i.e., > 48 m [157 ft] in diameter) and are often found in the interior ice pack where the sea ice coverage is greater than 90% (Simpkins et al., 2003). They remain in contact with ice most of the year and pup on the ice in late winter-early spring. Ringed seals are found throughout the Beaufort, Chukchi, and Bering Seas, as far south as Bristol Bay in years of extensive ice coverage (Figure 3). During late April through June, ringed seals are distributed throughout their range from the southern ice edge northward (Burns and Harbo, 1972; Burns et al., 1981; Braham et al., 1984). Preliminary results from recent surveys conducted in the Chukchi Sea in May-June 1999 and 2000 indicate that ringed seal density is higher in nearshore fast and pack ice and lower in offshore pack ice (Bengtson et al., 2005). Results of surveys conducted by Frost and Lowry (1999) indicate that, in the Alaskan Beaufort Sea, the density of ringed seals in May-June is higher to the east than to the west of Flaxman Island. The overall winter distribution is probably similar, and it is believed there is a net movement of seals northward with the ice edge in late spring and summer (Burns, 1970). Thus, ringed seals occupying the Bering and southern Chukchi Seas in winter apparently are migratory, but details of their movements are unknown.

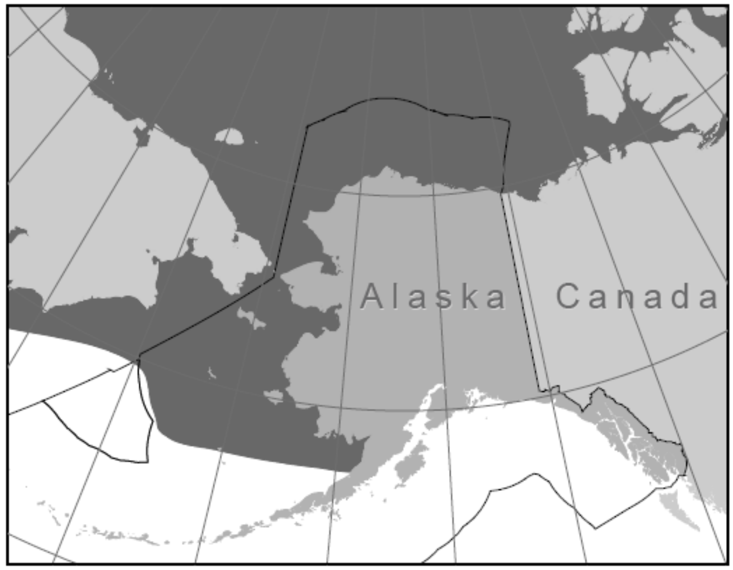

Figure 3. Approximate distribution of ringed seals (shaded area). The combined summer and winter distribution are depicted. (Adopted from Allen and Angliss (2010)).

Life History: Ringed seals are the smallest of the pinnipeds found in Alaska, rarely exceeding 1.5 m (5 ft) and 68 kg (150 lbs). They are grey in color, with black spots. In Alaska, ringed seals mostly eat Arctic cod, saffron cod, and crustaceans.

Ringed seals overwinter on pack and shorefast ice (Bengston et al., 2005). They create breathing holes in the newly formed ice and maintain them throughout the year by scraping the sides using nails on their foreflippers (Smith and Hammill 1981). The seals excavate subnivean lairs above some of the holes to give birth and nurse their pups between March and April. Nursing lasts 4 – 6 weeks, during which time the pups stay in the lairs. The lairs protect the pups against hypothermia and predation by Arctic foxes and polar bears (Smith et al., 1991). When forced to flee into the water to avoid predators, the pups that survive depend on the subnivean lairs to subsequently warm themselves. Ringed seal movements during the subnivean period typically are quite limited, especially where ice cover is extensive (Kelly and Quakenbush, 1990 cited in

Kelly et al., 2010). Ringed seals in the Bering and Chukchi seas typically molt from mid-May to early July.

Population and Abundance: A reliable abundance estimate for the entire Alaska stock of ringed seals is currently not available. One partial estimate of ringed seal numbers was based on aerial surveys conducted in May-June 1985-1987 in the Chukchi and Beaufort Seas from southern Kotzebue Sound north and east to the U.S.-Canada border (Frost et al., 1988). Effort was directed towards shorefast ice within 37 km (23 mi) of shore, though some areas of adjacent pack ice were also surveyed. The estimate of the number of hauled out seals in 1987 was 44,360 ± 9,130 (95% CI). During May-June 1999 and 2000 surveys were flown along lines perpendicular to the eastern Chukchi Sea coast from Shishmaref to Barrow (Bengtson et al., 2005). Bengtson et al. (2005) indicate that the estimated abundance of ringed seals for the study area (corrected for seals not hauled out) in 1999 and 2000 was 252,488 and 208,857, respectively. Similar surveys were flown in 1996-1999 in the Alaska Beaufort Sea from Barrow to Kaktovik. Observed seal densities in that region ranged from 0.81 to 1.17/km^2 (Frost et al., 2002, 2004). Moulton et al. (2002) surveyed some of the same area in the central Beaufort Sea during 1997-1999, and reported lower seal densities than Frost et al. (2002). Frost et al. (2002) did not produce a population estimate from their 1990s Beaufort Sea surveys. However, the area they surveyed covered approximately 18,000 km^2 (L. Lowry, University of Alaska Fairbanks, pers. comm., cited in Allen and Angliss, 2010), and the average seal density for all years and ice types was 0.98/km^2 (Frost et al., 2002), which indicates that there were approximately 18,000 seals hauled out in the surveyed portion of the Beaufort Sea. Combining this with the average abundance estimate of 230,673 from Bengtson et al. (2005) for the eastern Chukchi Sea results in a total of approximately 249,000 seals. This is a minimum population estimate because it does not include much of the geographic range of the stock, and the estimate for the Alaska Beaufort Sea has not been corrected for the number of ringed seals not hauled out at the time of the surveys. Nonetheless, it provides an update to the estimate from 1987.

Conservation Status: Ringed seals are not listed as "depleted" under the MMPA. Due to a very low level of interactions between U.S. commercial fisheries and ringed seals, the Alaska stock of ringed seals is not considered a strategic stock.

NMFS received a petition from the Center for Biological Diversity (CBD) to list ringed seals under the ESA on May 28, 2008, due to loss of sea ice habitat caused by climate change in the Arctic (CBD, 2008). NMFS published a *Federal Register* notice (73 FR 51615; September 4, 2008), indicating that there were sufficient data to warrant a review of the species. On December 10, 2010, NMFS published a notice of proposed threatened status for subspecies of ringed seals (75 FR 77476) in the *Federal Register*. This notice, divided the ringed seal into four subspecies. The one most likely to occur in the proposed project area is the Arctic subspecies (*Phoca hispida hispida*).

3.2.2.2 Bearded Seal

Distribution: Bearded seals (*Erignathus barbatus*) are circumpolar in their distribution, extending from the Arctic Ocean (85°N) south to Hokkaido (45°N) in the western Pacific. They generally inhabit areas of shallow water (less than 200 m [656 ft]) that are at least seasonally ice covered. During winter they are most common in broken pack ice (Burns, 1967) and in some areas also inhabit shorefast ice (Smith and Hammill, 1981). In Alaska waters, bearded seals are distributed over the continental shelf of the Bering, Chukchi, and Beaufort Seas (Ognev, 1935; Johnson et al., 1966; Burns, 1981; Figure 4). Bearded seals are evidently most concentrated from January to April over the northern part of the Bering Sea shelf (Burns, 1981; Braham et al., 1984). Spring surveys conducted in 1999 and 2000 along the Alaskan coast indicate that bearded seals tend to prefer areas of between 70% and 90% sea ice coverage and are typically more abundant 37-185 km (23-115 mi) from shore than within 37 km (23 mi) of shore, with the exception of high concentrations nearshore to the south of Kivalina (Bengtson et al., 2000; Bengtson et al., 2005; Simpkins et al., 2003). Many of the seals that winter in the Bering Sea move north through the Bering Strait from late April through June and spend the summer along the ice edge in the Chukchi Sea (Burns, 1967; Burns, 1981). The overall summer distribution is quite broad, with seals rarely hauled out on land, and some seals may not follow the ice northward but remain in open-water areas of the Bering and Chukchi Seas (Burns, 1981; Nelson, 1981; Smith and Hammill, 1981). An unknown proportion of the population moves southward from the Chukchi Sea in late fall and winter, and Burns (1967) noted a movement of bearded seals away from shore during that season as well.

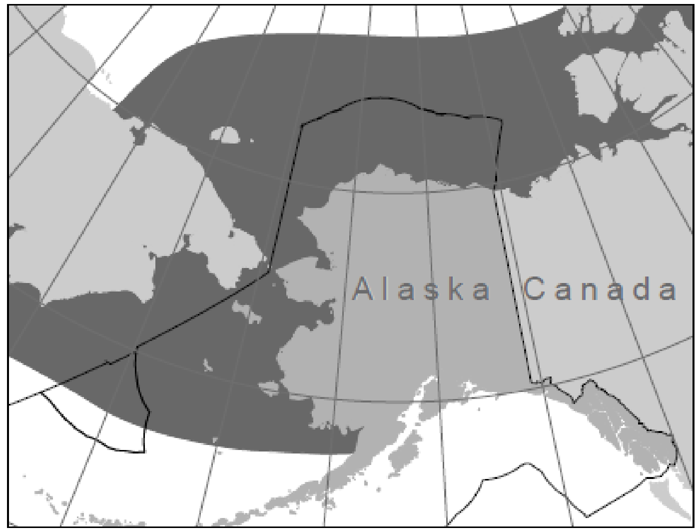

Figure 4. Approximate distribution of bearded seals (shaded area). The combined summer and winter distribution are depicted. (Adopted from Allen and Angliss (2010)).

Life History: Bearded seals are the largest of the northern seals, weighing up to 340 kg (750 lbs). Their color ranges from light brown to dark brown and sometimes silvery grey. They are easily distinguishable from other seals in the area because of their large size and their uniquely long whiskers.

Throughout most of their range, adult bearded seals are seldom found on land. Bearded seals are closely associated with sea ice, particularly during the critical life history periods related to reproduction and molting, and they can be found in a broad range of different ice types. The female gives birth to a single pup, weighing around 34 kg (75 lbs). Pupping occurs on drifting ice floes from late March through May (Kovacs et al., 1996). The whelping season for bearded seals in the Bering and Chukchi Seas appears to occur between March and May with a peak in April. Pups are typically weaned when they are around 24 days old (Kovacs et al., 1996).

Bearded seals are benthic feeders. They mainly feed on or in seafloor sediments, and their prey includes crabs, shrimp, and clams (Reeves et al., 1992).

Population and Abundance: Early estimates of the Bering-Chukchi Sea population range from 250,000 to 300,000 (Popov, 1976; Burns, 1981). Surveys flown from Shishmaref to Barrow during May-June 1999 and 2000 resulted in an average density of 0.07 seals/km^2 and 0.14 seals/km^2, respectively, with consistently high densities along the coast to the south of Kivalina (Bengtson et al., 2005), which is part of the proposed action area. These densities cannot be used to develop an abundance estimate because no correction factor is available. There is no reliable population abundance estimate for the Alaska stock of bearded seals.

Conservation Status: Bearded seals are not listed as "depleted" under the MMPA. Due to a very low level of interactions between U.S. commercial fisheries and bearded seals, the Alaska stock of bearded seals is not considered a strategic stock.

NMFS received a petition from CBD to list bearded seals under the ESA on May 28, 2008, due to loss of sea ice habitat caused by climate change in the Arctic (CBD, 2008). NMFS published a *Federal Register* notice (73 FR 51615; September 4, 2008), indicating that there were sufficient data to warrant a review of the species. On December 10, 2010, NMFS published a notice of proposed threatened status for proposed distinct population segments (DPSs) of the *Eringnathus barbatus nauticus* subspecies of bearded seals and a not warranted status for the *E. b. barbatus* subspecies of bearded seals (75 FR 77496) in the *Federal Register*. Only the *E. b. nauticus* subspecies is likely to occur in the proposed project area, and, of the two DPSs of that subspecies, only the proposed Beringia DPS is expected to occur in the proposed project area.

3.2.2.3 Polar Bear

Distribution and Habitat: Polar bears (*Ursus maritimus*) are the top predators of the Arctic marine ecosystem (Amstrup, 2003) and are distributed throughout regions of arctic and subarctic waters where the sea is ice-covered for large portions of the year (Figure 5).

The size of a polar bear's home range is determined, in part, by the annual pattern of freeze-up and breakup of sea ice and, therefore, by the distance a bear must travel to access prey (Durner et al., 2004). Polar bear life history is intimately linked to the sea ice environment, with sea ice providing the platform from which bears hunt, travel, mate, and sometimes den (Amstrup, 2003).

Seasonal movement patterns of polar bears illustrate their association with ice, as these movements appear correlated to the patterns of ice formation and ablation. Measured monthly movements of polar bear in the Beaufort Sea showed movements to the north from May–August. In October bears moved back to the south (Stirling and Derocher, 1990; Amstrup et al., 2000), as October is usually the month of freeze-up in the southern Beaufort Sea and ice becomes available over the shallow water near shore. Polar bears prefer shallow-water areas, perhaps reflecting similar preferences as their primary prey, ringed seals, as well as the higher productivity in these areas (Durner et al., 2004; MMS, 2007).

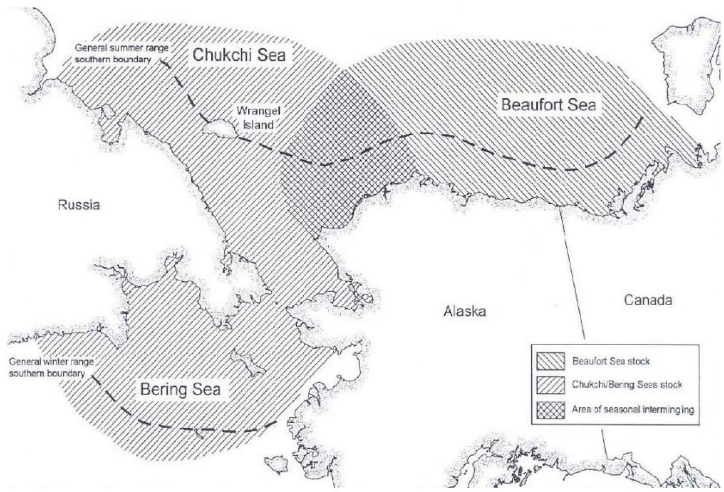

Figure 5. Range map of Beaufort Sea and Chukchi Sea polar bear stocks. (Adopted from USFWS (2009b)).

The distribution of seals and the habitat selection patterns by bears in the Beaufort Sea suggest that most polar bears do not feed extensively in the summer (Durner et al., 2004; MMS, 2007); in fact, 75% of bear locations in the summer occur on sea ice in waters greater than 350 m (1,148 ft) deep, which places them outside of prey concentrations and outside the proposed seismic survey area. Amstrup et al. (2000) showed that polar bears in the Beaufort Sea have their lowest level of movements in September, which correlates with the period when the sea ice has carried polar bears beyond the preferred habitat of seals (MMS, 2007).

The months showing the highest movement rate for polar bears and highest activity area in the Beaufort Sea were June–July and November–December (Gloerson et al., 1992). The mean annual distance moved by six bears (followed by satellite telemetry) in the Chukchi Sea was 5,542 km (3,444 mi). To illustrate the potential mobility of polar bears in regions of continually changing ice patterns, the mean rate of northerly spring movement was approximately 14 km/day (9 mi/day) (Garner et al., 1990). The sea ice of the Chukchi and Beaufort Seas is dynamic and unpredictable, and the mobility of polar bears in these areas appears to be directly correlated to that variability (Garner et al., 1990; Gloerson et al., 1992). The coast, barrier islands, and shorefast ice edge provide a corridor for polar bears during the fall, winter, and spring months. Late winter and spring leads that form offshore from the Chukchi Sea coast also provide important feeding habitat for polar bears (MMS, 2007). These polynyas reach their maximum extent in June. By July, however, the polynyas no longer exist, and this area becomes relatively ice-free.

Recent research has indicated that the total sea ice extent has declined over the last few decades in both nearshore areas and in the amount of multi-year ice in the polar basin (Parkinson and Cavalieri, 2002). As a result of potential effects from predicted ice conditions, USFWS found the polar bear to be threatened. On October 21, 2009, the USFWS proposed to designate critical habitat for the polar bear (USFWS, 2009b). The area USFWS has proposed as critical habitat for polar bear covers 322,739 km^2 (200,541 mi^2) of U.S. land and water and is categorized into three types of habitat: sea ice habitat; terrestrial denning habitat; and barrier island habitat.

Life History: Polar bears exist in relatively small populations and have low reproductive rates, requiring a high rate of survival to maintain population levels. The average reproductive interval for a polar bear is 3–4 years, and a female may produce 8–10 cubs in her lifetime, of which only 50 – 60% will survive to adulthood (Amstrup, 2003).

In the northern Alaska coastal areas, pregnant females enter maternal dens by late November and emerge as late as early April. Maternal dens typically are located in snow drifts in coastal areas, stable parts of the offshore pack ice, or on landfast ice (Amstrup and Gardner, 1994). Studies indicate that more bears are now denning nearshore rather than in far offshore regions (Fischback et al., 2007). The highest density of land dens in Alaska occur along the coastal barrier islands of the eastern Beaufort Sea and within the Arctic National Wildlife Refuge (USFWS, 2009b). Insufficient data exist to accurately quantify polar bear denning locations along the Alaskan Chukchi Sea coast; however, dens in the area appear to be less concentrated than for other areas in the Arctic. The majority of denning of Chukchi Sea polar bears occurs on Wrangel Island, Herald Island, and other locations on the northern Chukotka coast of Russia (USFWS, 2009b).

Polar bears derive essentially all their sustenance from marine mammal prey. The high fat intake from specializing on marine mammal prey allows polar bears to thrive in the harsh Arctic environment (Stirling and Derocher, 1990; Amstrup, 2003; USFWS, 2009b). Over much of their range, polar bears are dependent on the ringed seal (Smith, 1980). Where common, bearded seals can be a large part of polar bear diets and are probably the second most common prey item (Derocher et al., 2002). Walrus can be seasonally important in some parts of the polar bear‘s range (USFWS, 2009b). Polar bears occasionally rely on belugas, narwhals, harbor seals, and marine mammal carcasses along the shoreline (USFWS, 2009b).

Population and Abundance: There are two polar bear stocks recognized in Alaska: the southern Beaufort Sea (SBS) stock and the Chukchi/Bering Seas (CBS) stock, though there is considerable overlap between the two in the western Beaufort/eastern Chukchi Seas (MMS, 2007). The ranges of these stocks are shown in Figure 5.

The SBS population ranges from the Baillie Islands, Canada, west to Point Hope, Alaska, and is subject to harvest from both countries. This stock is not anticipated to occur in the proposed project area. The CBS stock ranges from Point Barrow, Alaska, west to the Eastern Siberian Sea (MMS, 2007). The CBS population is widely distributed on the pack ice of the northern Bering, Chukchi, and eastern portions of the Eastern Siberian seas (Garner et al., 1990; Garner et al., 1994; USFWS, 2009b).

A reliable population estimate for the CBS stock currently does not exist (USFWS, 2009b; Allen and Angliss, 2010). Reliable estimates of population size based upon mark and recapture studies are not available for this region, and measuring the population size is a research challenge. The current Russian polar bear harvest is believed to exceed sustainable levels, as models run by the USFWS indicate that the average annual harvest of 180 bears could potentially reduce the population by 50% within 18 years (USFWS, 2003). The International Union for Conservation of Nature (IUCN) Polar Bear Specialist Group (Aars et al., 2006) estimated this population to be approximately 2,000 animals, based on extrapolation of multiple years of denning data for Wrangel Island, assuming that 10% of the population dens annually as adult females (Aars et al., 2006). Due to the lack of information concerning the CBS population and to the high levels of illegal harvest, the IUCN Species Survival Commission Polar Bear Specialist Group has designated it as “declining” (MMS, 2007; Aars et al., 2006; USFWS, 2009b; Allen and Angliss, 2010).

Conservation Status: Polar bears in the U.S. Arctic are currently listed as "threatened" under the ESA and therefore are classified as depleted under the MMPA. The conservation and management of polar bears are under the jurisdiction of the USFWS.

3.3 Socioeconomic Environment

3.3.1 Traditional Knowledge

Traditional Knowledge, or TK, also known as indigenous knowledge and traditional ecological knowledge (TEK), is the collective knowledge possessed by a community and passed down from generation to generation for hundreds, if not thousands, of years. This knowledge is the product of the relationship a particular culture has with its environment based on experience and adaptation over a long period of time. It can be ecological in nature, pertaining to the plants and animals within an ecosystem, and their respective relationships to each other and to the people who use them. It can also be environmental, such as information regarding snow, ice, and weather conditions (Hansen and VanFleet, 2003; Miraglia, 1998).

According to the Alaska Native Science Commission (ANSC), TK is more than a tool that people use to survive and thrive in their environment; it is a way of life (ANSC, 2009). While rooted in the past, the term "traditional" is not meant to imply that the information is old, but rather based on tradition and "created in a manner that reflects the traditions of communities, therefore not relating to the nature of the knowledge itself, but to the way in which that knowledge is created, preserved, and disseminated" (Hansen and VanFleet, 2003). TK is a living system that can be altered to reflect changing environmental conditions, cultural values, and spiritual or philosophical views, among other things. Contemporary TK incorporates non-traditional information, such as science, resulting in a modern, holistic way of existing with one's natural environment (ANSC, 2009).

The need for and the process of transferring information about life—values, traditions, history, family, roles, technologies, lessons, etc.—from one generation to another is very important to the Iñupiat. Iñupiat TK is more than just the local knowledge of the North Slope and Northwest Arctic areas; it is also the act of transferring knowledge. According to Jana Harcharek, Iñupiaq educator and Coordinator of the NSB school district's bilingual and multicultural department, TK "endures through the continuing practice of customs associated with a subsistence lifestyle" (Harcharek, 1995).

In northern Alaska, TK serves to inform hunters when particular animals should be hunted, as well as how to treat the spirits of those animals (Panikpak Edwardsen, 1980). It is used as a way to teach children what their community expects of them. It is used to predict the weather, assess the safety of ice, and govern the use of resources (ANSC, 2009; McNabb, 1990). Iñupiaq knowledge is usually transmitted orally through songs, stories, and dance. It cannot be separated from the Iñupiat people who own it; it is their history, maintained in the present, advising their future.

Not only is it important that TK continue with the Iñupiaq communities, but Iñupiaq residents strive to have TK recognized and appreciated by those outside their culture. Former NSB mayor George Ahmaogak stressed the importance of applying TK in industry and government activities

(Ahmaogak, 1995; NSB, 2005). Additionally, residents have requested mandatory incorporation of TK in study, research, and monitoring plans (NSB, 2005).

3.3.2 Community and Economy

The Chukchi Sea communities that may be affected by the proposed polar bear capture-recapture program Point Hope and Kivalina. Point Hope is within the North Slope Borough (NSB; Figure 6); Kivalina is in the Northwest Arctic Borough (NWAB; Figure 7). This section summarizes the NSB and NWAB and their economies.

3.3.2.1 North Slope Borough

In land mass, the NSB is the largest borough in the State of Alaska and encompasses 230,509 km^2 (89,000 mi^2). It extends across the top of Alaska from Point Hope on the Chukchi Sea to the Canadian border and from the Brooks Range to the Arctic Ocean (NSB, 2005). Fewer than 7,600 residents inhabit eight villages. The villages are Kaktovik, Nuiqsut, Anaktuvuk Pass, Atqasuk, Barrow, Wainwright, Point Lay, and Point Hope.

The North Slope geographic area includes three regions with different climate, drainage, and geological characteristics: the Arctic Coastal Plain; the Brooks Range Foothills; and the northern portion of the Brooks Range. Arctic Slope Regional Corporation (ASRC), one of thirteen Alaska Native regional corporations, encompasses the North Slope and has substantial land and mineral rights.

The Iñupiat are the predominant inhabitants of eight villages in the region. Iñupiat have lived in the region for centuries and have actively traded with Canadian Natives (Alaska Department of Commerce, Community, and Economic Development [ADCCED], 2007). Vital to the Iñupiaq culture throughout the region are traditional whaling and other subsistence hunting, fishing, trapping, and gathering activities (NSB, 2005).

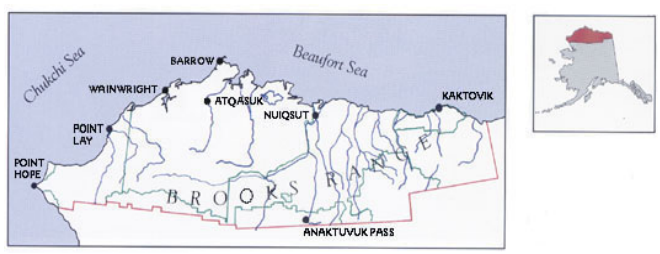

Figure 6. Map showing villages of NSB.

The NSB government is funded by oil tax revenues; it provides public services to all of its communities and is the primary employer of local residents. North Slope oil field operations provide employment to over 5,000 non-residents, who rotate in and out of oil worksites from Anchorage, other areas of the state, and the lower 48 states. Census figures are not indicative of this transient worksite population (ADCCED, 2007).

Air travel provides the only year-round access, while land transportation provides seasonal access. The Dalton Highway provides road access to Prudhoe Bay, although it is restricted during winter months. “Cat-trains” (a train of sleds, cabooses, etc., pulled by a Caterpillar™ tractor, used chiefly in the north during winter to transport freight) are sometimes used to transport freight overland from Barrow during the winter.

It is important to understand the economic drivers in the NSB and influence area of the Chukchi Sea Lease Sale 193. Future regional and local economic development depends on natural resource development. This very development has the potential to affect the environment and subsistence use areas. The resource development-based economy also provides jobs and opportunity. With the cash-based economy, residents are pulled from their subsistence economy, decreasing the TK of subsistence reserves and habitat.

ASRC and the village corporations exert considerable economic force in the region, providing employment in all sectors of the regional economy. Aside from the multinational resource development corporations, other major players in the North Slope economy are the Federal government, State of Alaska, and local governments. The NSB is at the center of the region's economy, providing public services and facilities funded by oil and gas tax revenues. Revenues from oil and gas development provide most of the revenues to the NSB. These revenues are currently on the decline (Northern Economics, Inc., 2006).

High unemployment and underemployment remain characteristics of the North Slope, according to the North Slope Borough 2003 Economic Profile and Census Report. Most of the employment in the NSB is in the public sector: local; state; or Federal government (Shepro et al., 2003).

3.3.2.2 Northwest Arctic Borough

The NWAB is the second-largest borough in Alaska, by size, encompassing approximately 101,010 km^2 (39,000 mi^2) along Kotzebue Sound and along the Wulik, Noatak, Kobuk, Selawik, Buckland, and Kugruk Rivers. It has a population of 7,407. The area has been occupied by Iñupiat for at least 10,000 years. Communities located within the Borough include Ambler, Buckland, Deering, Kiana, Kivalina, Kobuk, Kotzebue, Noorvik, Selawik, and Shungnak and the unincorporated community of Noatak (ADCCED, 2009).

Activities related to government, mining, health care, transportation, services, and construction contribute to the NWAB economy. The Red Dog Mine, 145 km (90 mi) north of Kotzebue, is the world's largest zinc and lead mine and provides 370 direct year-round jobs and over a quarter of the Borough's wage and salary payroll. The ore is owned by NANA Regional Corporation and leased to Teck Alaska Incorporated (formerly Teck Cominco), which owns and operates the mine and shipping facilities.

Teck Alaska Incorporated, Maniilaq Association, the NWAB School District, Veco Construction (now owned by CH2M HILL), and Kikiktagruk Iñupiat Corporation are the borough's largest employers. The smaller communities rely on subsistence food-gathering and Native craftmaking; 162 Borough residents hold commercial fishing permits (ADCCED, 2009).

The economy of the NWAB is fueled by government jobs, in addition to opportunities provided by mining, health care, transportation, and construction industries. Subsistence remains a significant economic factor in the NWAB, in the smaller communities in particular. As in the NSB, subsistence and wage-based employment exist as the primary interdependent aspects of the overall economy.

Kotzebue is the largest town in the NWAB and serves as the regional economic center, as well as transportation center. Transportation-related activities, resulting from the community's location at the confluence of several major river systems in conjunction with its marine docking facilities, contribute significantly to the local economy (NWAB, 2009). Kotzebue maintains a higher rate of employment and mean income than smaller communities in the region. In 1991, nearly 75% of adults in the community reported holding some type of wage employment, though over half of those held seasonal jobs, and only 45% were employed year-round. This is due in large part to the town's role as an economic center and the availability of seasonal jobs in the construction and fishing industries. Employment with Federal, state, and local government provide the majority of resources for the community (MMS, 1995). One hundred twelve residents have commercial fishing permits (NWAB, 2009).

Figure 7. Map showing villages of the NWAB.

The economy in Kivalina is more heavily influenced by subsistence activities, which are supplemented and financed by wage-based employment (NWAB, 2009). Government services in the administration, education, health, and social services sectors provide the primary employment opportunities in the community, and secondary economic contributions come from mining and retail trade. Kivalina has a relatively low level of employment, approximately 56% in 1991, and only 20% of available jobs provided year-round employment (MMS, 1995). Art and jewelry produced from subsistence resources generate revenue for Kivalina residents. Local stores and airlines also provide jobs in the community, which has no restaurants or hotels. Two Kivalina residents have commercial fishing permits (NWAB, 2009).

3.3.3 Subsistence

To the Iñupiat of northern Alaska, subsistence is more than a legal definition or means of providing food; subsistence is life. The Iñupiaq way of life is one that has developed over the course of generations upon generations. Their adaptations to the harsh arctic environment have enabled their people and culture to survive and thrive for thousands of years in a world seen by outsiders as unforgiving and inhospitable. Subsistence requires cooperation on both the family and community level. It promotes sharing and serves to maintain familial and social relationships within and between communities.

Subsistence is an essential part of local economies in the arctic, but it also plays an equally significant role in the spiritual and cultural realms for the people participating in a subsistence lifestyle (Brower, 2004). Traditional stories feature animals that are used as subsistence resources, conveying the importance of subsistence species within Iñupiaq society. These stories are used to pass information pertaining to environmental knowledge, social etiquette, and history between generations, as well as to strengthen social bonds. The Iñupiaq way of life is dependent upon and defined by subsistence.

Subsistence foods have been demonstrated to contain important vitamins and antioxidants that are better for one's health than processed foods purchased at stores. Consumption of subsistence foods can lower rates of diabetes and heart disease and may help to prevent some forms of cancer. Traditional foods in the arctic contain high levels of vitamin A, iron, zinc, copper, and essential fats; and the pursuit of subsistence resources provides exercise, time with family, and a spiritual as well as cultural connection with the land and its resources (Nobmann, 1997).

Subsistence activities in the NSB today are inextricably intertwined with a cash economy. The price of conducting subsistence activities is tied to the price of the boats, snow machines, gas, and other modern necessities required to participate in the subsistence lifestyle of Alaska's North Slope. Many people balance wage employment with seasonal subsistence activities, presenting unique challenges to traditional and cultural values regarding land use and subsistence. Some studies have indicated a correlation between higher household incomes and commitment to, and returns from, the harvesting of natural resources (NRC, 1999). Surveys conducted by the NSB reveal a majority of households continue to participate in subsistence activities and depend on subsistence resources (Shepro et al., 2003).

Quantification of subsistence resources harvested is difficult, and errors are inherent in the data. Some of the problems associated with the collection of subsistence data can be traced to individuals' willingness to share information and the difficulty of conducting subsistence surveys around peak harvest times, as well as cultural and language complexities (SRBA, 1993; Fuller and George, 1997) . Another issue that comes up when documenting subsistence species harvested is the misidentification of species. Locals often use a colloquial term for a particular resource, which can vary between communities and can be at odds with the classifications of western science. By appearance, some fish species are so comparably similar that they are commonly mistaken for one another, including Dolly Varden, an anadromous species, and Arctic char, which is the closely related, lake-occurring species. Other species often misidentified include burbot, which are commonly referred to as ling cod; least cisco, sometimes called herring; and chum salmon, which can be mistaken for silver salmon. Some species of birds are also misidentified. White-fronted geese are confused with Canada geese, and various species of eiders, especially females, can be confused with each other (Fuller and George, 1997).

The proposed action will not interfere with subsistence fishing. Therefore, it is not discussed further in this document.

Marine mammals are legally hunted in Alaskan waters by coastal Alaska Natives. The main species that are hunted include bowhead and beluga whales, ringed, spotted, and bearded seals, walruses, and polar bears. The importance of each of these species varies among the communities and is largely based on availability. The subsistence communities in the Chukchi Sea that have the potential to be impacted by the USFWS' proposed action include Point Hope and Kivalina. During the spring months that the USFWS' capture work is proposed to be conducted both of these communities hunt bowhead whales and ice seals. Hunting for both bowhead whales and ice seals typically occurs within 24 km (15 mi) or less of the community, according to local residents. At Point Hope, hunters have informed the USFWS that they hunt only to the west and south of Point Hope.

In Point Hope, the bowhead whale hunt occurs between March and June, when the pack-ice lead is usually 10–11 km (6–7 mi) offshore. Camps are set up along the landfast ice edge to the south and southeast of the village. Point Hope whalers took between one and seven bowhead whales per year between 1978 and 2008, with the exception of 1980, 1989, 2002, and 2006, when no whales were taken (Suydam and George, 2004 cited in Statoil, 2010; Suydam et al., 2005, 2006, 2008). There is no fall bowhead hunt in Point Hope, as the whales migrate back down on the west side of the Bering Strait, out of range of the Point Hope whalers (Fuller and George, 1997). In Point Hope, belugas are also hunted in the spring, coincident with the spring bowhead hunt. A second hunt takes place later in the summer, in July and August, and can extend into September, depending on conditions and the International Whaling Commission quota. The summer hunt is conducted in open water along the coastline on either side of Point Hope, as far north as Cape Dyer (MMS, 2007). Belugas are smaller than bowhead whales, but beluga whales often make up a significant portion of the total harvest for Point Hope (Fuller and George, 1997; SRBA, 1993). Ninety-eight belugas harvested in 1992 made up 40.3% of the total edible harvest for that year. Three bowhead whales represented 6.9% of the total edible harvest for the same year (Fuller and George, 1997). Figure 8 depicts the traditional bowhead hunting areas for the residents of Point Hope.

Seals are available to Point Hope residents from October through June; however, because of the availability of bowhead and caribou during various times of the year, seals are harvested primarily during the winter months, from November through March. The ringed seal is the most common hair seal species harvested, and the month of February is the most concentrated harvest period for this species. Hair seals are hunted from south of Cape Thompson to as far north as Ayugatak Lagoon (Figure 9). The area south of Point Hope is safer and more advantageous for hunting seals. In good weather, it is safe for a hunter to travel 16-24 km (10-15 mi) offshore of the southern side of the point; however, it is more common for residents to hunt seals closer to shore. The area north of the point is more dangerous for seal hunting because of the poor ice conditions. Seal hunting in this area occurs closer to shore and is most successful at Sinuk, near the mouth of the Kukpuk River, and at the numerous small points between Point Hope and Cape Lisburne, where open water is found (i.e., Kilkralik Point and Cape Dyer). South of the point, ringed seal hunting generally is concentrated within 8 km (5 mi) of shore on the ice pack between Point Hope and Akoviknak Lagoon. Some hair seal hunting takes place directly off the point when the ice first forms in October and early November.

Hunting of the bearded seal is an important subsistence activity in Point Hope; the meat is a preferred food and the skin is used to cover whaling boats. Most bearded seals are harvested during May and June, sometimes as late as mid-July, as the landfast ice breaks up into floes. More bearded seals than the smaller hair seals are harvested because of the former's larger size and use for skin-boat covers. Bearded seals, like hair seals, are hunted from Cape Thompson to Ayugatak Lagoon.

Based on the information regarding timing of the hunts in Point Hope, there should be minimal overlap between the polar bear capture-recapture program and the hunts. There is the potential for overlap in time with bearded seal and cetacean hunts. However, based on the depiction of traditional use areas by hunters for these species (Figures 8 and 9), the hunts occur much closer to shore than the proposed overflights and captures (up to 161 km [100 mi] offshore).

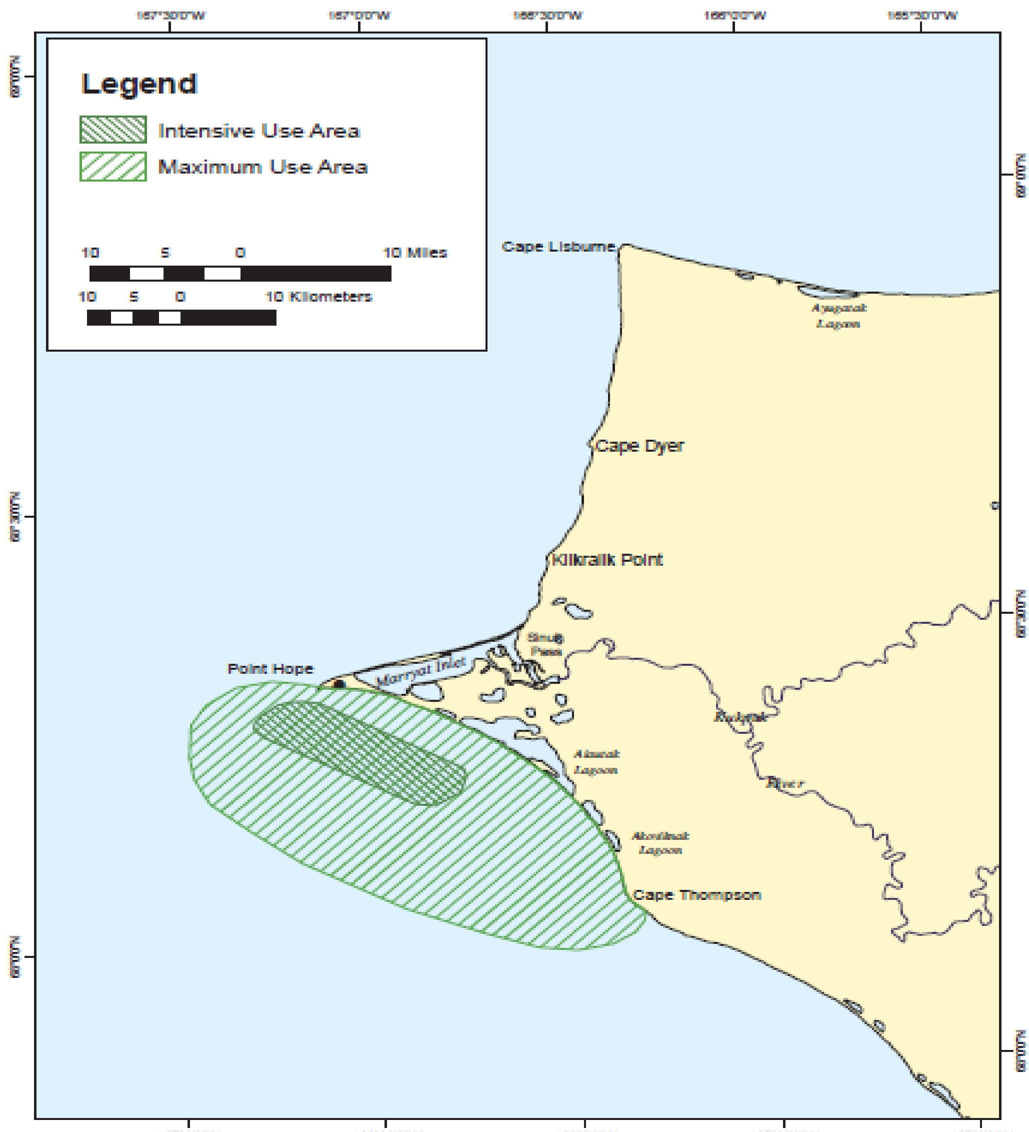

Figure 8. Point Hope historic bowhead whale subsistence use areas (Braund and Birnham, 1984 cited in MMS, 2008).

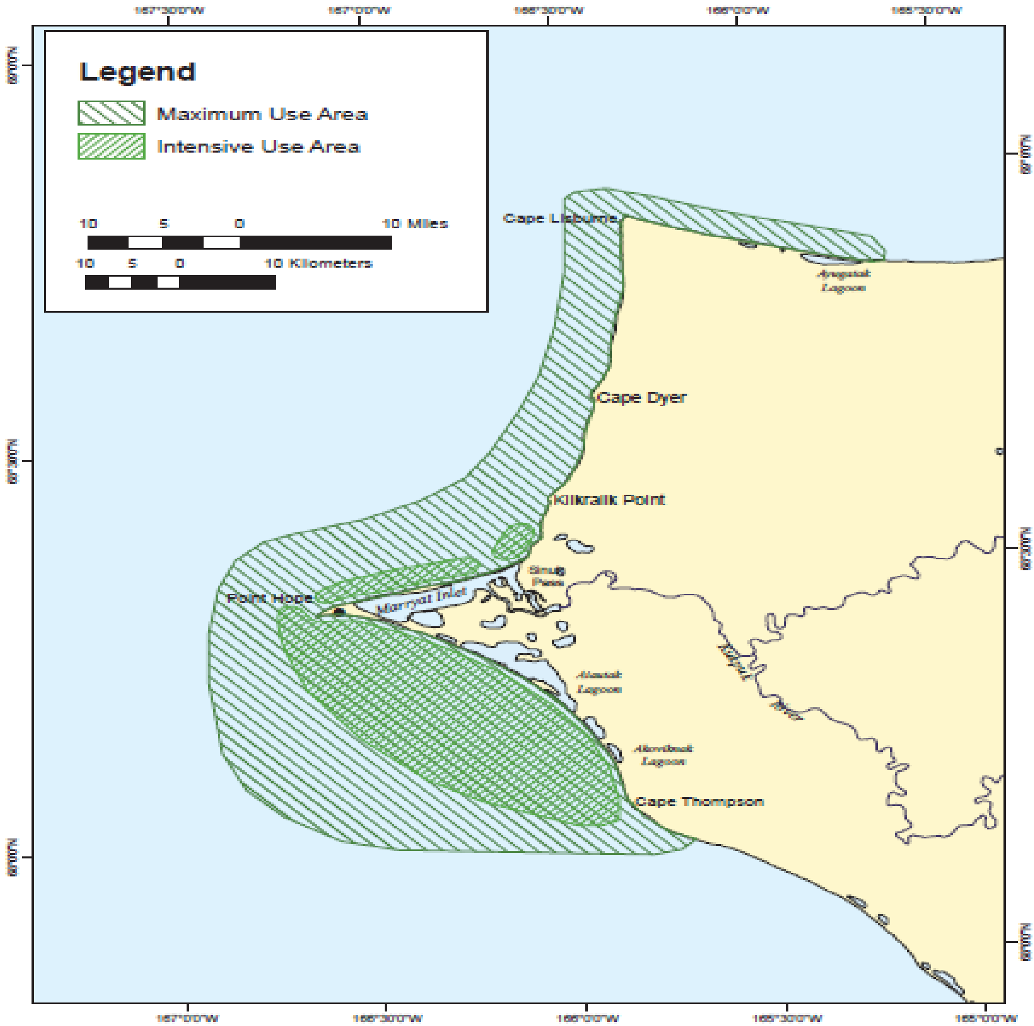

Figure 9. Point Hope historic seal subsistence use areas (Braund and Birnham, 1984 cited in MMS, 2008).

Kivalina participates in both a spring and summer beluga whale hunt. The spring hunt can start as early as March, when offshore leads are present and ice conditions permit it. Early belugas are from the Beaufort Sea stock that winters in the Bering Sea and summers in the Mackenzie River delta; they migrate through leads running parallel to the shoreline that recur in most years from one to several miles offshore of Kivalina beginning in late March and April; hunting takes place generally from late April through May, often coinciding with the hunt for bowhead whales. In some years, more than one parallel lead forms, while in other years, leads do not form at all or form only sporadically through the whaling season. Because of these variable ice conditions, successful hunting for spring beluga depends on prevailing ice conditions during the migration. In some years westerly winds close accessible leads; in other years more than one offshore lead forms, allowing belugas to move through leads farther offshore and escape subsistence hunters (Burch, 1985; U.S. Army Corps of Engineers, 2005). The best spring hunting conditions for Kivalina occur when a single and accessible lead forms offshore Kivalina and ends just north of the community. Under these conditions, belugas are concentrated in an area accessible to local hunters. Another ideal situation for hunting beluga occurs when a lead in which the belugas have been migrating closes, and they become trapped in a small patch of open water (Braund, 1999). Like in Point Hope, the summer beluga hunt typically occurs in late June and July.

Kivalina is too far east of the main bowhead whale spring migration path to intercept them in any great numbers, but bowheads do occasionally follow the nearshore leads that run past Kivalina. Kivalina hunters begin watching for bowheads in the leads north and south of Kivalina in late April (Figure 10). Ice conditions are critical for a successful hunt, and bad ice conditions can prevent the hunt in some years. Bowheads and early spring belugas can travel together, and similar ice conditions can affect both hunts. The Alaska Eskimo Whaling Commission has authorized Kivalina four bowhead strikes annually, but it is uncommon for the community to take a whale. Based on the location of the typically bowhead hunts for Kivalina, it is unlikely that the proposed action will have any impacts on the hunt.

Ice conditions determine the level of effort required to hunt seals and often determine the success of the hunt. The thickness of shorefast ice can affect the distribution of ringed and bearded seals and affect the safety of hunters traveling on the ice. Hunting for seals can begin as early as January or February but usually is not active until March or April, when ice and weather conditions are generally better; seal hunting typically peaks in June, which is after the timeframe for the proposed activity. Warmer weather brings seals out onto the ice to bask in the sun, where they are more vulnerable to hunters, but these weather conditions also cause melt water to pool on the ice and make hunter access more difficult. Seals typically are hunted from boats from April to June when leads form in the ice.

Spotted seals are not as abundant or as heavily hunted in the Kivalina area as in other parts of the region. Ringed seals are widely distributed, and local subsistence hunters generally consider them easier to harvest than other seals. In the past, ringed seals were very important to the local subsistence economy and were harvested in higher numbers than any other resource until the 1990s, when the harvest numbers of bearded seals overtook them. A 1992 Alaska Department of Fish & Game (ADF&G) subsistence survey conducted in the community indicated a harvest of 110 ringed seals—2.9% of the total subsistence harvest (Burch, 1985; Braund, 1999; Runyan, 2001; U.S. Army Corps of Engineers, 2005).

Ringed seals are stalked and shot with rifles while they are basking on the shorefast ice or drifting floes. They also are shot in the water and recovered with a grappling hook known to local hunters as a seal hook. Ringed seals may be hunted as soon as the ice forms in November or December, but most of the hunting and harvest of ringed seals now takes place between February and late June, when the seals concentrate on the ice near cracks and leads or on floes. Ringed seals are mostly taken on shorefast ice, but sometimes they are hunted on pack ice from March through May in conjunction with hunts for bearded seals and beluga whales (Burch, 1985; U.S. Army Corps of Engineers, 2005).

Bearded seals historically were harvested in fewer numbers than ringed seals, but the bearded seal harvest has now eclipsed the ringed seal harvest. Adult bearded seals are at least five times heavier than adult ringed seals and make a greater dietary contribution. A 1992 ADF&G subsistence survey conducted in the community indicated a harvest of 269 bearded seals—20.6% of the total subsistence harvest (Burch 1985; U.S. Army Corps of Engineers, 2005). From November through August, bearded seals are hunted from shorefast and pack ice near Kivalina. The customary Kivalina hunting area for bearded seals is shown in Figure 11 (Braund, 1999, 2000 cited in MMS, 2008). Bearded seals in the Kivalina area typically are stalked and shot with rifles when their numbers peak in June and when large numbers are basking along leads and on floes. Because bearded seals mostly inhabit thin or broken pack ice, most of the harvest takes place in spring, making them difficult or dangerous to reach the rest of the year. Bearded seals vary in their alertness and wariness, depending on the time of year, and are relatively tolerant of aircraft and boats.

Bearded seal is the principal species used for providing seal oil. Seal oil has many traditional uses, including use as a preservative for other subsistence foods and as a condiment. Traditionally, seal oil is also valued medicinally for curing frostbite, colds, and other ailments; it also has spiritual value in Iñupiaq culture for promoting a feeling of “well being” and a connection to the culture when eaten. Historically, seal oil was traded with inland communities that did not have access to coastal hunting areas. A traditional food known as “dark meat,” is made from dried bearded seal meat, and the fermented flipper also is a traditional food. Almost every part of all seal species had traditional uses (Burch, 1985; U.S. Army Corps of Engineers, 2005).

Based on the information regarding timing of the hunts in Kivalina, there should be minimal overlap between the polar bear capture-recapture program and the hunts. There is the potential for overlap in time with bearded seal and cetacean hunts. However, based on the depiction of traditional use areas by hunters for these species (Figures 10 and 11), the hunts occur closer in to Kotzebue Sound (where the proposed activity will not occur) and much closer to shore than the proposed overflights and captures (up to 161 km [100 mi] offshore).

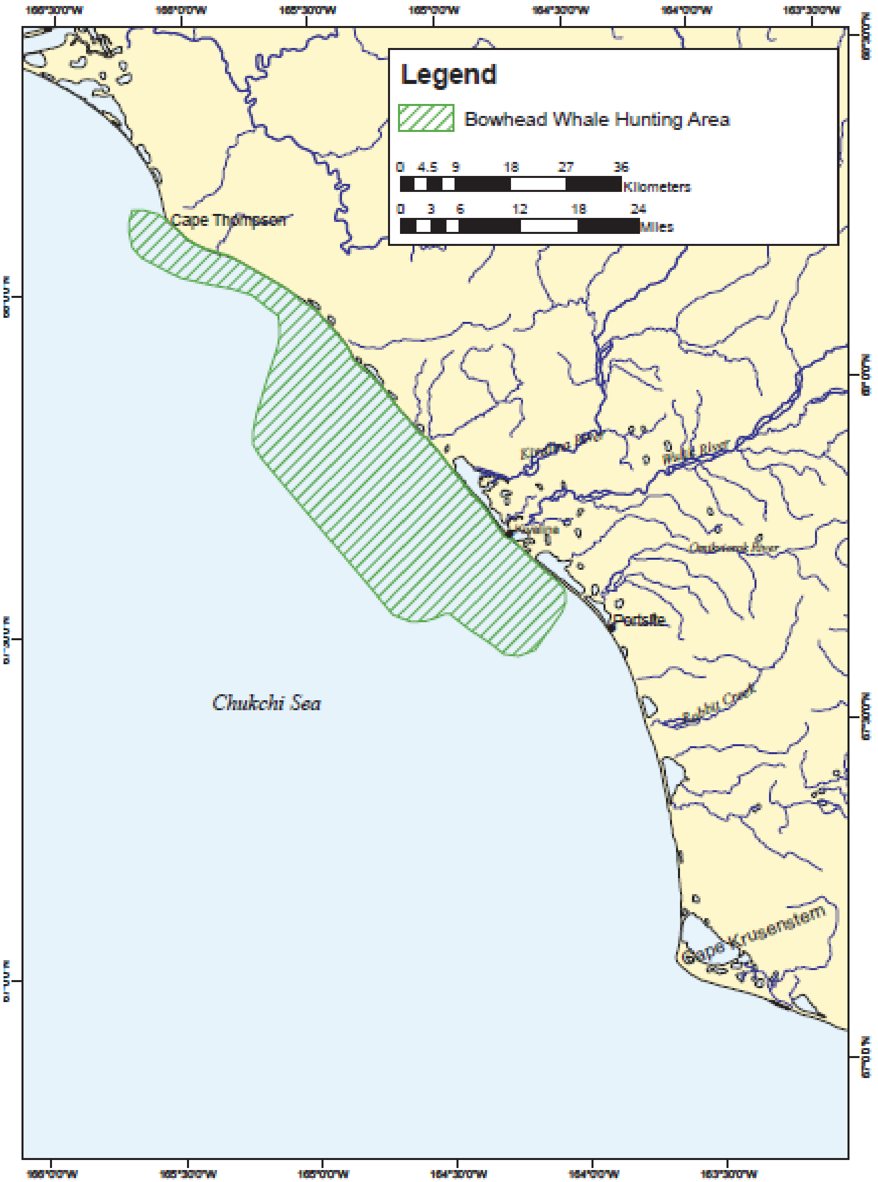

Figure 10. Traditional Kivalina hunting area for bowhead whale (Braund, 2000 cited in MMS, 2008).

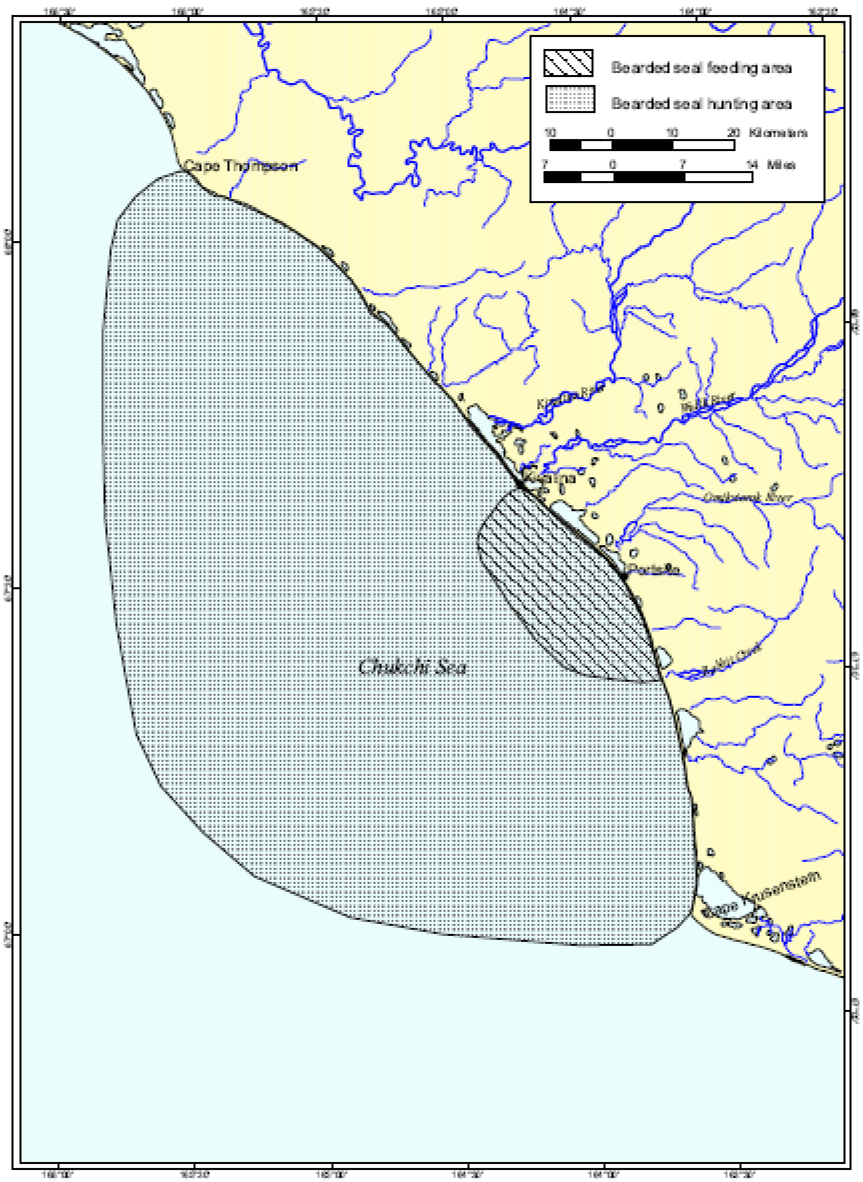

Figure 11. Traditional Kivalina hunting area for bearded seals (Braund, 2000 cited in MMS, 2008).

Chapter 4 ENVIRONMENTAL CONSEQUENCES

This chapter outlines the effects or impacts to the aforementioned resources in the Chukchi Sea from the proposed action and alternatives. Significance of those effects is determined by considering the context in which the action will occur and the intensity of the action. The context in which the action will occur includes the specific resources, ecosystem, and the human environment affected. The intensity of the action includes the type of impact (beneficial versus adverse), duration of impact (short versus long term), magnitude of impact (minor versus major), and degree of risk (high versus low level of probability of an impact occurring).

The terms “effects” and “impacts” are used interchangeably in preparing these analyses. The CEQ’s regulations for implementing the procedural provisions of NEPA, also state, “Effects and impacts as used in these regulations are synonymous” (40 CFR §1508.8). The terms “positive” and “beneficial”, or “negative” and “adverse” are likewise used interchangeably in this analysis to indicate direction of intensity in significance determination.

4.1 Effects of Alternative 1—No Action Alternative

Under the No Action Alternative, NMFS would not issue an IHA to the USFWS for the proposed polar bear capture-recapture program in the Chukchi Sea. In this case, the USFWS would decide whether or not it would want to continue with the polar bear capture-recapture program, which is authorized by the USFWS. If the USFWS chose not to conduct the proposed activity, then there would be no incidental harassment of marine mammal species in the proposed action area. Conducting these activities without an MMPA authorization (i.e., an IHA) could result in a violation of Federal law. If the USFWS decides to conduct some or all of the activities without implementing any mitigation measures, and if activities occur when marine mammals are present in the action area, there is the potential for unauthorized harassment of marine mammals. Behavioral harassment of marine mammals is possible both from the sound and/or the presence of the aircraft. If the USFWS conducts the proposed activity without an IHA from NMFS, then the activity may occur without the implementation of any mitigation measures. This may increase the magnitude of behavioral harassment. Yet, if the USFWS decided to implement mitigation measures similar to those described in Chapter 5 of this EA, then the impacts would most likely be similar to those described for Alternative 2 below. However, injury or mortality is not anticipated with or without the implementation of mitigation measures.

Not conducting the research program could have adverse effects to the Chukchi-Bering Seas polar bear population. The USFWS scientists are trying to obtain information on bear health, body condition, movement patterns, habitat use, and demography. This information is needed to help inform management (particularly the setting of harvest quotas) under the U.S.-Russia treaty that was implemented in 2008, identify appropriate mitigation for oil and gas exploration activities in the Chukchi Sea lease sale area, and the need to better monitor this population due to the listing of polar bears as “threatened” under the ESA. To date there has never been an estimate of the size or status (e.g. increasing, decreasing, or stable) of this population, and minimal research has been conducted to understand the population’s status or response to declining sea ice habitat. Estimates of human-caused removal for this polar bear population are high (100-200/yr in Russia and 30/yr in the U.S.), and sea ice loss has occurred at one of the highest rates in the circumpolar arctic. There is concern over the current status of this population due to these threats. If this program does not continue, it may be difficult to obtain information needed to better manage and protect the Chukchi-Bering Seas polar bear population.

4.2 Effects of Alternative 2—Preferred Alternative

Under this alternative, NMFS would issue an IHA to the USFWS for its proposed polar bear capture-recapture program in the Chukchi Sea during March through May 2011, with required mitigation, monitoring, and reporting requirements as discussed in Chapters 5 and 6 of this EA. As part of NMFS' action, the mitigation and monitoring described later in this EA would be undertaken as required by the MMPA, and, as a result, no serious injury or mortality of marine mammals is expected and correspondingly no impact on the reproductive or survival ability of affected species would occur. Potentially affected marine mammal species under NMFS' jurisdiction would be: bearded seal and ringed seal. Subspecies of both of these animals have been proposed for listing as threatened under the ESA.

4.2.1 Effects on the Physical Environment

The proposed action is not anticipated to have any effects on the geology and oceanography or air quality in the proposed action area. The activity will occur during a time of year when this portion of the Chukchi Sea is covered with sea ice. Therefore, none of the shoals, substrate, or other geologic or oceanographic features will be impacted by a helicopter flying overhead or landing on the sea ice. Additionally, the overflights are not anticipated to have major effects on air quality in the area. Only one fixed-wing or helicopter will be operating at any given time for a period of 6-8 weeks, with a total of 28-30 flight days, equating to approximately 200 flight hours over the course of the entire project. Based on the short duration of time that the aircraft will be in operation over the course of the project, no significant or adverse effects to air quality are anticipated from the proposed action.

Once a polar bear is located, the aircraft will land on the sea ice in order to conduct the scientific research on the polar bears and collect desired data and information. The aircraft would only land on sea ice that is thick enough to support the fixed-wing or helicopter aircraft, as not doing so would endanger the personnel onboard. Therefore, no significant, adverse, major, or long-term impacts are anticipated to any part of the physical environment in the proposed action area.

4.2.2 Effects on the Biological Environment

4.2.2.1 Effects on Marine Birds

The U.S. Chukchi Sea is home to many species of marine birds, several of which are listed as threatened or endangered under the ESA or candidate species for listing under the ESA. Although NMFS does not expect marine birds would be directly affected from the proposed action (issuing an IHA to the USFWS for a polar bear capture-recapture program in the Chukchi Sea), they could be indirectly affected by the polar bear capture-recapture program. Therefore, as part of the environmental analysis, the effects on marine birds are analyzed as part of the environmental consequences analysis.

The proposed action is not anticipated to have major or long-term impacts on any of the marine birds in the area. During this time of the year when the USFWS proposes to conduct the proposed project, many of these species are either not yet found in the project area or occur closer into shore or inland. The USFWS will be flying over the sea ice searching for polar bears up to 161 km (100 mi) from shore. Therefore, encounters with marine birds would mostly occur closer into shore during take-offs and landings. Collisions with the aircraft are highly unlikely, as the pilot will attempt to avoid all such collisions, as this could also endanger those onboard the aircraft. Noise from the aircraft is not anticipated to have any adverse effects on marine birds in the area.

Critical habitat has been designated for the spectacled eider just north of the northernmost portion of the proposed action area. However, the USFWS will not be conducting any overflights in the Ledyard Bay critical habitat area. Therefore, no impacts to critical habitat for marine birds are anticipated as a result of conducting the polar bear capture-recapture program or from NMFS' issuance of an IHA to the USFWS.

4.2.2.2 Effects on Marine Mammals

Potential effects to marine mammals could involve both acoustic and non-acoustic effects. It is uncertain if the seals react to the sound of the helicopter or to its physical presence flying overhead. Pinnipeds are able to hear both in-water and in-air sounds. However, they have significantly different hearing capabilities in the two media. For this proposed activity, only in-air hearing capabilities will be potentially impacted. The functional hearing range for pinnipeds in-air is 75 Hz to 30 kHz (Southall et al., 2007). Richardson et al. (1995) note that dominant tones in noise spectra from both helicopters and fixed-wing aircraft are generally below 500 Hz. Kastak and Schustermann (1995) state that the in-air hearing sensitivity is less than the in-water hearing sensitivity for pinnipeds. In-air hearing sensitivity deteriorates as frequency decreases below 2 kHz, and generally pinnipeds appear to be considerably less sensitive to airborne sounds below 10 kHz than humans. There is a dearth of information on acoustic effects of helicopter overflights on pinniped hearing and communication (Richardson et al., 1995), and, to NMFS' knowledge, there has been no specific documentation of temporary threshold shift (TTS), let alone permanent threshold shift (PTS), in free-ranging pinnipeds exposed to helicopter operations during realistic field conditions.

Typical reactions of hauled out pinnipeds to aircraft that have been observed include looking up at the aircraft, moving on the ice or land, entering a breathing hole or crack in the ice, or entering the water. Both ringed and bearded seals hauled out on the ice have been observed diving into the water when approached by a low-flying aircraft or helicopter (Burns and Harbo, 1972 cited in Richardson et al., 1995; Burns and Frost, 1979 cited in Richardson et al., 1995). Several of these reactions have been observed by USFWS scientists that have participated in this proposed study in past years. Richardson et al. (1995) note that responses can vary based on differences in aircraft type, altitude, and flight pattern. Additionally, a study conducted by Born et al. (1999) found that wind chill was also a factor in level of response of ringed seals hauled out on ice, as well as time of day and relative wind direction.

Born et al. (1999) determined that 49% of ringed seals escaped (i.e., left the ice) as a response to a helicopter flying at 150 m (492 ft) altitude. Seals entered the water when the helicopter was 1,250 m (4,101 ft) away if the seal was in front of the helicopter and at 500 m (1,640 ft) away if the seal was to the side of the helicopter. The authors noted that more seals reacted to helicopters than to fixed-wing aircraft. The study concluded that the risk of scaring ringed seals by small-type helicopters could be substantially reduced if they do not approach closer than 1,500 m (4,921 ft).

In 2000, Blackwell et al. (2004) conducted a study to measure impacts of pipe-driving sounds on ringed seals at Northstar Island, an oil production island in the Beaufort Sea. During that study, the authors found that after 55 hours of observation, the 23 ringed seals that were observed exhibited little or no reaction to any industrial noise except an approaching Bell 212 helicopter. [It should be noted that a Bell 212 helicopter is larger and considerably noisier than the Bell 206 helicopter proposed for use during the USFWS' project.] Twelve of the 23 seals were observed during helicopter overflights. Of those 12 individuals, one showed no reaction to the helicopter. Of the remaining 11 individual ringed seals, 10 increased their vigilance and looked at the helicopter, and one departed its basking site. That one individual entered the water when the helicopter circled over its hauled out position at a distance of approximately 100 m (328 ft; Blackwell et al., 2004).

Based on the available data and studies described here, any ringed or bearded seals found in the vicinity of the proposed project are only anticipated to have short-term behavioral reactions to the helicopter flying overhead. Those animals that do dive into a breathing hole or crack in the ice are anticipated to return to the ice shortly after the helicopter leaves the area, as the aircraft generally stays within the same area less than seconds. Hearing impairment (i.e., TTS or PTS) of pinnipeds hauled out on the ice is not anticipated as a result of the USFWS' proposed activity or NMFS' proposed action because pinnipeds will likely either dive into breathing holes or the water through cracks in the ice before the helicopter would be close enough to cause such an effect. No injuries or mortalities of ringed or bearded seals are anticipated from the proposed action.

The ringed seal breeding and pupping seasons occur during the same time as the proposed action. Mating occurs primarily under the ice in late April and early May. Females give birth to a single pup in a subnivian lair on the landfast or pack ice from mid-March to mid-April. The bearded seal breeding season typically occurs from about mid-March to mid-June. Mating occurs in the water. In the Chukchi Sea and Bering Strait (the location of this proposed action), the bearded seal pupping season typically occurs in late April, but it can occur anytime between mid-March and early May. Since mating occurs either under the ice or in the water, typical reactions of seals to helicopter overflights (e.g., leaving the ice, entering lairs) while hauled out on the ice would not occur. The animals would already be off of the exposed ice.

The USFWS' proposed activity and NMFS' proposed action (i.e., issuing an IHA for the incidental take of ringed and bearded seals) is not expected to have significant, negative effects on pupping in the area. Ringed seals nurse their pups in the subnivian lairs. Therefore, the mother/pup pairs would not be out on the ice when the helicopter flies overhead during nursing. Bearded seals nurse their pups on the ice. However, detailed studies on bearded seal mothers show they forage extensively, diving shallowly (<10 m [33 ft]) and spend only about 10% of their time hauled out with pups and the remainder nearby at the surface or diving (Holsvik, 1998; Krafft et al., 2000). Despite the relative independence of mothers and pups, their bond is described as strong, with females being unusually tolerant of threats in order to remain or reunite with pups (Krylov et al., 1964; Burns and Frost, 1979; Hammill et al., 1994; Lydersen et al., 1994). Therefore, it is not expected that the USFWS' proposed activities or NMFS' proposed action will have major impacts during the ringed or bearded seals' pupping seasons.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (24-hr cycle). Behavioral reactions to noise exposure (such as disruption of critical life functions, displacement, or avoidance of important habitat) are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall et al., 2007). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall et al., 2007). While it is possible that flights could occur on consecutive days, the flight schedule is weather dependent. Additionally, even if flights do occur on consecutive days, it is unlikely that the flight paths will be identical on consecutive days. Therefore, it is unlikely that hauled out seals will be exposed to the overflights on consecutive days. Moreover, since the helicopters only remain overhead for a few seconds at any one location, impacts lasting minutes to even hours are not expected.

Impacts to polar bears are also anticipated from the program. However, NMFS' proposed action is for the issuance of an IHA to cover the take of ringed and bearded seals from the overflights that will occur as part of the USFWS' overall proposed research program. Polar bears are under the jurisdiction of the USFWS. Therefore, the USFWS is required to issue a MMPA Section 104 scientific research permit to its own biologists in order to legally carry out this program. Since polar bears are the target of the scientific research program, effects beyond just the presence and noise of the aircraft may occur. The USFWS has conducted its own NEPA analysis on the effects of issuing a scientific research permit for the overall program.

4.2.3 Effects on the Socioeconomic Environment

No impacts on the economies of the NSB or NWAB are anticipated as a result of NMFS' proposed action. The USFWS' project is being undertaken by the Federal government and will utilize a single aircraft at any given time.

This document has incorporated TK in its evaluation of the environmental setting within which the proposed 2011 polar bear capture-recapture program in the Chukchi Sea would occur. Over the past three years, as part of its polar bear research program, the USFWS has consulted with local communities to identify no fly zones and incorporate this into their project design. The USFWS meets with community members in Point Hope (the community in closest proximity to much of the work) twice a year and communicates regularly with people in Kivalina as well. The TK imparted at these meetings has helped the USFWS ensure that their action does not impact traditional subsistence hunting areas.

Subsistence remains the basis for Alaska Native culture and community. Marine mammals are legally hunted in Alaskan waters by coastal Alaska Natives. NMFS has defined "unmitigable adverse impact" in 50 CFR 216.103 as:

> …an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence

needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

Noise and general activity during the USFWS' proposed polar bear program have the potential to impact marine mammals hunted by Native Alaskans. The helicopter overflights have the potential to disturb hauled out pinnipeds by causing them to vacate the area, which could potentially make the animals unavailable to subsistence hunters if the animals do not return to the area.

The USFWS' proposed activity and NMFS' proposed action are not anticipated to have adverse, major, or long-term impacts on subsistence hunts in the proposed action area. Many of the hunts for marine mammals occur outside of the timeframe for the proposed activity. Additionally, the majority of the USFWS' flight tracks will occur much further offshore than the typical sites for subsistence sealing and whaling during the mid-March to early May time period (see Figures 8 through 11).

The USFWS has also developed a Plan of Cooperation (POC) with the communities in closest proximity to the proposed action area (i.e., Point Hope and Kivalina). The POC outlines measures that the USFWS proposes to implement to reduce impacts to subsistence uses of marine mammals in the proposed action area. In consultation with local residents, the USFWS has determined that flying to the north and northwest of Point Hope would not interfere with subsistence activities. Therefore, the USFWS will restrict flights to avoid the areas 24 km (15 mi) to the south and west of Point Hope and within a 24 km (15 mi) radius of Kivalina. The majority of the USFWS' polar bear work occurs greater than 48 km (30 mi) offshore, which also minimizes the potential for flights to affect availability of ice seals to local hunters. Based on this information, NMFS has determined that the proposed action will not have an unmitigable adverse impact on the availability of marine mammal species or stocks for taking for subsistence uses.

4.3 Estimation of Take

For purposes of evaluating the potential significance of the takes by harassment, estimations of the number of potential takes are discussed in terms of the populations present. The specific number of takes considered for the authorizations is developed via the MMPA process, and the analysis in this EA provides a summary of the anticipated numbers that would be authorized to give a relative sense of the nature of impact of the proposed actions.

The marine mammal species NMFS anticipates to be taken by incidental harassment are the ringed and bearded seal. Take is anticipated to occur by Level B (behavioral) harassment only, resulting from the presence and/or sound of the aircraft flying overhead. Incorporation of the mitigation and monitoring measures described in Chapters 5 and 6 of this EA will further reduce the level of harassment and the likelihood that the proposed activity will result in no detectable impact on marine mammal species or stocks or on their habitats. No injury or mortality is anticipated, and the mitigation and monitoring measures described later in this EA will reduce that likelihood even further.

It is estimated that approximately 500 ringed seals and 100 bearded seals would be taken by Level B (behavioral) harassment incidental to the USFWS' proposed polar bear capture-recapture program in the Chukchi Sea. These take estimates represent 0.2% of the Alaska stock of 249,000 ringed seals and 0.04% of the Alaska stock of 250,000 bearded seals. These estimates represent the percentage of each species or stock that could be taken by Level B harassment if each animal is taken only once.

4.4 Cumulative Effects

Cumulative effect is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions" (40 CFR §1508.7). Cumulative impacts may occur when there is a relationship between a proposed action and other actions expected to occur in a similar location or during a similar time period, or when past or future actions may result in impacts that would additively or synergistically affect a resource of concern. These relationships may or may not be obvious. Actions overlapping within close proximity to the proposed action can reasonably be expected to have more potential for cumulative effects on "shared resources" than actions that may be geographically separated. Similarly, actions that coincide temporally will tend to offer a higher potential for cumulative effects.

Actions that might permanently remove a resource would be expected to have a potential to act additively or synergistically if they affected the same population, even if the effects were separated geographically or temporally. Note that the proposed action considered here would not be expected to result in the removal of individual marine mammals from the population or to result in harassment levels that might cause animals to permanently abandon preferred feeding areas or other habitat locations, so concerns related to removal of viable members of the populations are not implicated by the proposed action. This cumulative effects analysis considers these potential impacts, but more appropriately focuses on those activities that may temporally or geographically overlap with the proposed activity such that repeat harassment effects warrant consideration for potential cumulative impacts to the affected two marine mammal species and their habitats.

Cumulative effects on affected resources that may result from the following activities—seismic survey activities, vessel and air traffic, oil and gas exploration and development in Federal and state waters, subsistence harvest activities, industrial development, and climate change—within the proposed action area are discussed in the following subsections. The following describes projects and activities based in and along the Chukchi Sea coast that may, but would not necessarily, result in potential cumulative adverse impacts to the physical, biological, and socioeconomic environment.

4.4.1 Subsistence Hunting of Ice Seals

The Division of Subsistence, ADF&G maintains a database that provides additional information on the subsistence harvest of ice seals in different regions of Alaska (ADF&G, 2000a, 2000b). Information on subsistence harvest of bearded seals has been compiled for 129 villages from reports from the Division of Subsistence (Coffing et al., 1998; Georgette et al., 1998; Wolfe and Hutchinson-Scarbrough, 1999) and a report from the Eskimo Walrus Commission (Sherrod, 1982). Data were lacking for 22 villages; their harvests were estimated using the annual per capita rates of subsistence harvest from a nearby village. As of August 2000; the subsistence harvest database indicated that the estimated number of bearded and ringed seals harvested for subsistence uses per year are 6,788 and 9,567, respectively.

At this time, there are no efforts to quantify the current level of harvest of bearded seals by all Alaska communities. However, the USFWS collects information on the level of ice seal harvest in five villages during their Walrus Harvest Monitoring Program. Results from this program indicated that an average of 239 bearded seals were harvested annually in Little Diomede, Gambell, Savoonga, Shishmaref, and Wales from 2000 to 2004, and 47 ringed seals from 1998 to 2003 (Allen and Angliss, 2010). Since 2005, harvest data are only available from St. Lawrence Island (Gambell and Savoonga) due to lack of walrus harvest monitoring in areas previously monitored. There were 21 bearded seals harvested during the walrus harvest monitoring period on St. Lawrence Island in 2005, 41 in 2006, and 82 in 2007. There were no ringed seals harvested on St. Lawrence Island in 2005, 1 in 2006, and 1 in 2007.

4.4.2 Climate Change

Global and regional climates have changed throughout the Earth's history, but warming during the past several decades on the North Slope and vicinity has been unusually rapid (NRC, 2003b). Changes associated with arctic warming complicate and confound the assessment and isolation of the effects of oil and gas activities on the North Slope and the Chukchi Sea. If recent warming trends continue, their effects could accumulate to alter the extent and timing of sea ice; affect the composition, distribution, and abundance of marine and terrestrial plants and animals; affect permafrost; affect existing oil-field infrastructure; and affect coastal Alaskan Native subsistence cultures (NRC, 2003b).

The scientific evidence indicates that average air, land, and sea temperatures are increasing at an accelerating rate. Although climate changes have been documented over large areas of the world, the changes are not uniform and affect different areas in different ways and intensities. Arctic regions have experienced some of the largest changes, with major implications for the marine environment, as well as for coastal communities. Recent assessments of climate change, conducted by international teams of scientists (Gitay et al., 2002; ACIA, 2004; IPCC, 2007), have reached several conclusions of consequence for this EA:

- Average Arctic temperatures increased at almost twice the global average rate in the past 100 years.
- Satellite data since 1978 show that perennial arctic sea ice extent has shrunk by 2.7% per decade, with larger decreases in sea ice extent in summer of 7.4% per decade.

- Ice cover in the Arctic Ocean has been shrinking by about 3% per decade over the past 20 years (Johannessen et al., 1999), and that the Arctic may be reverting in some ways to initial conditions not seen since the 1970s (NOAA, 2006).
- Arctic sea ice thickness has declined by about 40% during the late summer and early autumn in the last three decades of the twentieth century.
- The ice pack is retreating from the land sooner in the spring and reforming later in the fall. This affects the timing of phytoplankton blooms and zooplankton concentrations.
- The ice pack is retreating further seaward than in the past, which creates larger areas of open water near coastal areas and leads to larger waves, higher storm surges, and accelerated rates of coastal erosion. This dynamic is exacerbated by rising sea levels due to thermal expansion of seawater and other sources.
- The arctic tundra is warming rapidly, causing permafrost to thaw deeper in the summer and over much larger areas than previously observed, accompanied by substantial changes in vegetation and hydrology.
- The melting ice pack, melting glaciers, and increased precipitation are adding large amounts of freshwater to the sea, causing decreases in salinity that may combine with longer ice-free seasons to affect the timing and intensity of phytoplankton blooms.

Climate change associated with Arctic warming may result in regime change of the Arctic Ocean ecosystem. Sighting of humpback whales in the Chukchi Sea during the 2007 Shell deep seismic surveys (Funk et al., 2008) may indicate the expansion of habitat by this species as a result of ecosystem regime shift in the Arctic. These species, in addition to minke and killer whales, and four pinniped species (harp, hooded, ribbon, and spotted seals) that seasonally occupy Arctic and subarctic habitats may be poised to encroach into more northern latitudes and to remain there longer, thereby competing with extant Arctic species (Moore and Huntington, 2008)

In the past decade, geographic displacement of marine mammal population distributions has coincided with a reduction in sea ice and an increase in air and ocean temperatures in the Bering Sea (Grebmeier et al., 2006). Continued warming is likely to increase the occurrence and resident times of subarctic species such as spotted seals and bearded seals in the Beaufort Sea. The result of global warming would significantly reduce the extent of sea ice in at least some regions of the Arctic (ACIA, 2004; Johannessen et al., 2004).

Ringed seals, which are true Arctic species, depend on sea ice for their life functions and give birth to and care for their pups on stable shorefast ice. The reductions in the extent and persistence of ice in the Beaufort Sea almost certainly could reduce their productivity (Ferguson et al., 2005; NRC, 2003b), but at the current stage, there are insufficient data to make reliable predictions of the effects of Arctic climate change on the Alaska ringed seal stock (Allen and Angliss, 2010). In addition, bearded seals would also be vulnerable to reductions in sea ice, although insufficient data exist to make reliable predictions of the effects of Arctic climate change on these two species (Allen and Angliss, 2010). However, NMFS recently proposed subspecies of both ringed and bearded seals be listed as threatened under the ESA (75 FR 77476, December 10, 2010; 75 FR 77496, December 10, 2010).

The most recent analysis of climate change (IPCC, 2007) concluded that there is very strong evidence for global warming and associated weather changes and that humans have “very likely” contributed to the problems through burning fossil fuels and adding other "greenhouse gasses" to the atmosphere. This study involved numerous models to predict changes in temperature, sea level, ice pack dynamics, and other parameters under a variety of future conditions, including different scenarios for how human populations respond to the implications of the study. It is not clear how governments and individuals will respond or how much these future efforts will reduce greenhouse gas emissions. Although the intensity of climate changes will depend on how quickly and deeply humanity responds, the models predict that the climate changes observed in the past 30 years will continue at the same or increasing rates for at least 20 years.

With the large uncertainty of the degree of impact of climate change to Arctic marine mammals, NMFS recognizes that warming of this region, which results in the diminishing of ice, could be a concern to ice dependent seals and polar bears. Nonetheless, NMFS considers the combined effects of the proposed polar bear capture-recapture program by the USFWS during 2011 and climate change are too remote and speculative at this time to conclude definitively that the issuance of a MMPA IHA for the 2011 proposed polar bear program would contribute to climate change, and therefore a reduction in Arctic sea ice coverage upon which ice seals depend. More research is needed to determine the magnitude of the impact, if any, of global warming to marine mammal species in the Arctic and subarctic regions.

4.4.3 Geophysical Surveys and Oil and Gas Development

While geophysical surveys and oil and gas development projects do not occur in the same area as the proposed flight paths for the USFWS' proposed polar bear capture-recapture program, such activities in other parts of the U.S. Chukchi and Beaufort Seas have the potential to impact the same stocks of ringed and bearded seals that may be affected by the proposed action.

4.4.3.1 Marine and Seismic Surveys

Seismic surveys (permitted by the Department of the Interior's [DOI] Bureau of Ocean Energy Management, Regulation and Enforcement [BOEMRE; formerly MMS]) have been conducted in the Federal waters of the Chukchi and Beaufort Seas since the late 1960s/early 1970s (MMS, 2007). Over this period, more MMS-permitted seismic activity has occurred in the Beaufort Sea Outer Continental Shelf (OCS) than in the Chukchi Sea OCS (MMS, 2007). From 2005-2010, NMFS has issued 12 IHAs to oil and gas companies for the incidental take of several marine mammal species (including ringed and bearded seals) from open-water seismic surveys and marine survey programs and six IHAs to oil and gas companies for the incidental take of several marine mammal species (including ringed and bearded seals) from on-ice seismic surveys in the U.S. Beaufort and Chukchi Seas. On-ice surveys typically only occur in the Beaufort Sea. Open-water surveys can occur in both seas.

Three seismic or marine surveys are proposed for the Chukchi OCS and Beaufort OCS in the second half of 2011. ION Geophysical (ION) plans to conduct a 2D seismic survey in the Alaskan Beaufort Sea extending from the U.S.–Canadian border in the east to Point Barrow in the west (ION, 2010). Two survey lines also extend west of Point Barrow into the Chukchi Sea. The proposed survey would acquire seismic data from approximately October 1 to December 15, 2011. ION states that the purpose of the seismic survey is to collect seismic reflection data that reveal the subbottom profile for assessments of geologic origin and potential petroleum reserves. ION plans to employ a 28-airgun array with a total operating volume of 4,330 in^3. The seismic survey is expected to take place in water depths ranging from approximately 20 m (66 ft) to more than 3,500 m (11,483 ft). ION submitted an IHA application for the incidental take of marine mammals that could potentially result from this proposed seismic survey program. NMFS is currently reviewing its application and evaluating the potential impacts to marine mammals and their habitat.

Shell Offshore Inc. and Shell Gulf of Mexico Inc. (collectively "Shell") plans to conduct an open-water marine survey program, which includes site clearance and shallow hazards surveys, ice gouge and strudel scour surveys, and geotechnical seafloor soil sampling, in the U.S. Beaufort and Chukchi Sea OCS Planning Areas from approximately July through October 2011. These activities would utilize a variety of devices that emit sound into the marine environment: (1) dual-frequency side scan sonar; (2) single beam echo sounder; (3) multi-beam echo sounder; (4) an airgun array of either 40 in^3 or 60 in^3; (5) medium penetration profiler; (6) sub-bottom profiler; (7) geotechnical soil boring unit; (8) CPT seabed equipment; and (9) a piston core. Shell submitted an IHA application for the incidental take of marine mammals that could potentially result from this proposed marine survey program. NMFS is currently reviewing its application and evaluating the potential impacts to marine mammals and their habitat.

Additionally, although Statoil has not yet submitted an application to NMFS for the incidental take of marine mammals during an open-water marine survey program, it is anticipated that they will conduct such a program in either 2011 or 2012. The program would be similar and utilize similar equipment to that described above for Shell. The proposed marine survey program would likely occur on leases held by Statoil in the Chukchi Sea OCS Planning Area.

Given the growing interest of oil and gas companies to explore and develop oil and gas resources on the Arctic Ocean OCS, there is the potential that seismic surveys will continue in the Chukchi and Beaufort seas into the near future and be dependent on: (1) the amount of data that is collected in 2011; and (2) what the data indicate about the subsurface geology. NMFS anticipates that future marine and seismic surveys will continue as the demands on oil and gas are expected to grow worldwide.

In addition to marine and seismic surveys operated by the oil and gas industry, academia, research institutions, and government agencies also conduct geophysical surveys using airguns to study ocean bottom sediments and geological structure. The U.S. Geological Survey (USGS) conducted a marine geophysical (seismic reflection/refraction) and bathymetric survey in the Arctic Ocean in August and September, 2010 (USGS, 2010). The survey was conducted from the Canadian Coast Guard (CCG) vessel *CCGS Louis S. St. Laurent* (*St. Laurent*) and was accompanied by the U.S. Coast Guard Cutter (USCGC) *Healy*, both of which are polar-class icebreakers. A similar program is scheduled to occur on the High Seas of the Arctic Ocean (approximately 1,287 km [800 mi] from the Beaufort Sea coast) in August and September 2011.

Acoustic sources onboard the *St. Laurent* have and would include an airgun array comprised of three Sercel G-airguns and a Knudsen 320BR "Chirp" pulse echo sounder operating at 12 kHz. The *St. Laurent* would also tow a 3 to 5 kHz sub-bottom profiler while in open-water and when not working with the *Healy*. The airgun array consists of two 500 in^3 and one 150 in^3 airguns for an overall discharge of 1,150 in^3. The *Healy* would break and clear ice approximately 1.6 to 3.2

km (1 to 2 mi) in advance of the *St. Laurent*. The *Healy* would use a multi-beam echo sounder (Kongsberg EM122), a sub-bottom profiler (Knudsen 3.5 kHz Chirp), and a "piloting" echosounder (ODEC 1500) continuously when underway and during the seismic profiling. Acoustic Doppler current profilers (75 kHz and 150 kHz) may also be used on the *Healy*.

Available information, however, does not indicate that marine and seismic surveys for oil and gas exploration activities has had detectable long-term adverse population-level effects on the overall health, current status, or recovery of marine mammals species and populations in the Arctic region. An assessment of the cumulative impacts of seismic surveys must consider the decibel levels used, location, duration, and frequency of operations from the surveys, as well as other reasonably foreseeable seismic-survey activity. In general, the high-resolution, site clearance and shallow hazards surveys are of lesser concern regarding impacts to cetaceans than the deep 2D/3D surveys. High-resolution and 2D/3D seismic surveys usually do not occur in proximity to each other, as they would interfere with each others' information collection methods. This indirectly minimizes the potential for effects on marine mammals that could otherwise be exposed to areas with overlapping intense noise.

Finally, most marine and seismic surveys are limited in space and usually occur during the open water season to avoid data acquiring systems being damaged by floating ice. Therefore, the cumulative effects of the proposed and reasonably foreseeable future marine and seismic survey activities in the Beaufort and Chukchi Seas are not likely to appreciably impact the existing marine environment when added to the proposed action of issuing an IHA to the USFWS for its March-May polar bear capture-recapture program.

4.4.3.2 Oil and Gas Exploration, Development, and Production

Oil and gas exploration and production activities have occurred on the North Slope since the early 1900s, and production has occurred for more than 50 years. Since the discovery and development of the Prudhoe Bay and Kuparuk oil field, more recent fields generally have been developed not in the nearshore environment, but on land in areas adjacent to existing producing areas. Pioneer Natural Resources Co. is developing its North Slope Oooguruk field, which is in the shallow waters of the Beaufort Sea approximately 12.9 km (8 mi) northwest of the Kuparuk River unit.

BP Exploration (Alaska) Inc. (BP) is currently producing oil from an offshore development in the Northstar Unit, which is located between 3.2 and 12.9 km (2 and 8 mi) offshore from Point Storkersen in the Beaufort Sea. This development is the first in the Beaufort Sea that makes use of a subsea pipeline to transport oil to shore and then into the Trans-Alaska Pipeline System. The Northstar facility was built in State of Alaska waters on the remnants of Seal Island ~9.5 km (6 mi) offshore from Point Storkersen, northwest of the Prudhoe Bay industrial complex, and 5 km (3 mi) seaward of the closest barrier island. The unit is adjacent to Prudhoe Bay and is approximately 87 km (54 mi) northeast of Nuiqsut, an Inupiat community. To date, it is the only offshore oil production facility north of the barrier islands in the Beaufort Sea.

On November 6, 2009, NMFS received an application from BP requesting authorization for the take of six marine mammal species incidental to operation of the Northstar development in the Beaufort Sea, AK, over the course of 5 years, which would necessitate the promulgation of new five-year regulations (BP, 2009). Construction of Northstar was completed in 2001. The proposed activities for 2011 – 2016 include a continuation of drilling, production, and emergency training operations but no construction or activities of similar intensity to those conducted between 1999 and 2001 (75 FR 12734; March 17, 2010). NMFS is currently reviewing BP's request and analyzing potential impacts of the proposed operations to marine mammals and their habitat.

Shell's 2010 Exploration Plans for the Beaufort and Chukchi Seas were approved by MMS in the fall 2009/winter 2010. Shell planned to conduct two offshore exploration drilling programs, each on OCS leases in the Beaufort and Chukchi Seas, between July and October 2010 (Shell, 2010a, 2010b). However, DOI made a determination that Shell's Arctic exploration plan was suspended. Therefore, Shell's planned offshore exploration drilling programs did not happen in 2010. Shell does not intend to conduct any exploratory drilling programs in the U.S. Arctic Ocean in 2011. However, there is the potential for Shell to conduct exploratory drilling programs in 2012 or beyond. Therefore, NMFS has evaluated the cumulative effects associated with future exploration programs instead of specific ones. Currently there is no oil and gas drilling and production activities in the Chukchi Sea.

Existing onshore and offshore oil and gas development and production facilities and their associated pipelines have the potential to release industrial chemicals or spill oil. Oil spills from offshore production activities are of concern because as additional offshore oil exploration and production, such as the Liberty, Oooguruk, and Nikaitchuq projects, occurs, the potential for large spills in the marine environment increases. In addition to potential oil spills from industry infrastructure, the potential also exists for oil/fuel spills to occur from associated support vessels, fuel barges, and even aircraft. However, this risk is considered slight in ice-free waters, and any spills which result from the proposed action will most likely be of small volume, and are not considered a major threat to marine mammals in the action area. Even if a small oil/fuel spill were to occur, it would be easily avoidable by marine mammals. Any impacts to them most likely would include temporary displacement until cleanup activities are completed and short-term effects on health from the ingestion of contaminated prey. However, a large scale oil spill in the Arctic could be devasting to the region's marine ecosystem. However, since there is no drilling and oil production associated with the proposed USFWS polar bear capture-recapture program, and that the fuel the aircraft carries is of relatively small quantity, it is unlikely that an oil spill of significant scale would occur. Therefore, such disasters are unlikely in the Chukchi Sea.

Drilling for oil and gas in the Arctic generally occurs from natural and artificial islands, caissons, bottom-founded platforms, and ships and submersibles. With varying degrees, these operations produce low-frequency sounds with strong tonal components. Drilling occurs once a lease has been obtained for oil and gas development and production and may continue through the life of the lease.

Underwater sound from vessels operating near the Northstar facility in the Beaufort Sea often were detectable as far as 30 km (50 mi) offshore, while sounds from construction, drilling, and production reached background values at 2 - 4 km (1.24-2.5 mi). BP began to use hovercraft in 2003 to access Northstar, which have proven to generate considerably less underwater noise than similar-sized conventional vessels, and, therefore, may be an attractive alternative when there is concern over underwater noise (Richardson and Williams, 2004). Richardson and Williams (2004) concluded that there was little effect from the low-to-moderate level, low-frequency industrial sounds emanating from the Northstar facility on ringed seals during the open-water period, and that the overall effects of the construction and operation of the facility were minor, short term, and localized, with no consequences to the seal populations as a whole.

Drilling activities are expected to occur in the near future on Beaufort leases and the Northstar facility and within the Hammerhead leases and shoreline within the Point Thomson unit. Drilling in State waters is also expected to occur. Other active drilling will take place on land but at sites away from coastlines.

Given this information, the duration and frequency of drilling within marine mammal habitat is anticipated to be relatively minimal and impacts are not expected to be significant.

4.4.4 Vessel Traffic and Movement

Increasing vessel traffic in the Northwest Passage increases the risks of oil and fuel spills and vessel strikes of marine mammals. The proposed polar bear capture-recapture program is not expected to contribute to these risks, as no vessels will be used since the program will occur during the ice-covered season.

Vessel traffic in the Alaskan Arctic generally occurs within 20 km (12.4 mi) of coast and usually is associated with fishing, hunting, cruise ships, icebreakers, Coast Guard activities, and supply ships and barges. No extensive maritime industry exists for transporting goods. Traffic in the Beaufort and Chukchi Seas at present is limited primarily to late spring, summer, and early autumn.

Overall, the level of vessel traffic in the Alaska Arctic, either from oil- and gas-related activities or other industrial, military or subsistence activities, is expected to be greater than in the recent past.

Ships using the newly opened waters in the Arctic likely will use leads and polynas to avoid icebreaking and to reduce transit time. Leads and polynas are important habitat for polar bears and belugas, especially during winter and spring, and heavy shipping traffic could disturb polar bears and belugas during these critical times.

4.4.5 Conclusion

Based on the analyses provided in this section, NMFS has determined that the proposed USFWS polar bear capture-recapture program in the Chukchi Sea from mid-March through May would not be expected to add significant impacts to overall cumulative effects on marine mammals from past, present, and reasonably foreseeable future activities. The potential impacts to marine mammals and their habitat are expected to be minimal based on the limited noise footprint and the short duration of the proposed project. In addition, mitigation and monitoring measures described in Chapter 5 are expected to further reduce any potential adverse effects.

Chapter 5 MITIGATION MEASURES

As required under the MMPA, NMFS considered mitigation to effect the least practicable impact on marine mammals and has developed a series of mitigation measures, as well as monitoring and reporting procedures (Chapter 6), that would be required under the IHA issued to the USFWS for the proposed polar bear capture-recapture program described earlier in this EA. The mitigation requirements contained in the MMPA IHA will help to ensure that takings are of small numbers, potential impacts to marine mammals will be negligible, and that there will be no unmitigable adverse impacts to subsistence uses of the affected species or stocks. If issued, all mitigation measures contained in the IHA must be followed.

5.1 Biological Mitigation Measures

The following mitigation measures are proposed to be included in the IHA (if issued). Protocols for flights will include maintaining a 1.61 km (1 mi) radius when flying over areas where seals are concentrated in groups of 5 or more, such as cracks or areas of thin ice with multiple breathing holes, except when needed to do so for safety reasons. USFWS will not land on ice within 0.8 km (0.5 mi) of a hauled out seal. USFWS will also fly at altitudes higher than 91.4 m (300 ft) when closer to shore, unless personnel safety prohibits flying at this lower altitude, as polar bears are less likely to be found within 48 km (30 mi) of the coast. This will reduce impacts to seals hauled out on ice closer to shore but at the same time will not jeopardize the objectives of the proposed project.

5.2 Subsistence Mitigation Measures

Regulations at 50 CFR 216.104(a)(12) require IHA applicants for activities that take place in Arctic waters to provide a POC or information that identifies what measures have been taken and/or will be taken to minimize adverse effects on the availability of marine mammals for subsistence purposes. Over the past 3 years, as part of the work for the proposed activity, the USFWS regularly consults extensively with local communities to identify temporal and spatial no fly zones. These no fly zones occur in areas of subsistence activities. In consultation with local residents, the USFWS has determined that flying to the north and northwest of Point Hope would not interfere with subsistence activities. Therefore, the USFWS will restrict flights to avoid the areas 24 km (15 mi) to the south and west of Point Hope and within a 24 km (15 mi) radius of Kivalina. The majority of the USFWS' polar bear work occurs greater than 48 km (30 mi) offshore, which also minimizes the potential for flights to affect availability of ice seals to local hunters. The USFWS holds two meetings in Point Hope each year (the community in closest proximity to much of the work). For 2011, the USFWS has agreed with local whaling captains and community leaders to have regular, weekly communications to identify no fly zones and ensure that flight paths do not intersect areas of subsistence activity. The USFWS also regularly communicates with the community of Kivalina, although polar bears tend not to be concentrated in close proximity to this community, thus flight paths tend to occur well away from subsistence use areas.

5.3 Mitigation Conclusions

NMFS has carefully evaluated the applicant's proposed mitigation measures and considered a range of other measures in the context of the CEQ's requirement to discuss means to mitigate adverse environmental impacts. NMFS' evaluation of potential measures included consideration of the following factors in relation to one another:

- the manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- the practicability of the measure for applicant implementation.

Based on our evaluation of the applicants' proposed measures, NMFS has determined, after considering the CEQ's regulations, that the proposed mitigation measures under Alternative 2 (Preferred Alternative) are sufficient to minimize any potential adverse impacts to the human environment, particularly marine mammal species or stocks and their habitat.

Chapter 6 MONITORING AND REPORTING REQUIREMENTS

Under the Preferred Alternative (Alternative 2), NMFS would require the USFWS to undertake the following monitoring activities while conducting the proposed polar bear capture-recapture program in the U.S. Chukchi Sea. The reporting requirements described in section 6.2 would also be implemented under the Preferred Alternative. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for IHAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

6.1 Monitoring Requirements

As part of its application, the USFWS provided a proposed monitoring plan for assessing impacts to marine mammals from the aerial overflights during the proposed polar bear capture-recapture program.

The USFWS will have two biologists and one pilot onboard the helicopter during each flight. During the course of the capture efforts, USFWS will devote a staff member to monitoring the number of seals encountered and species continuously throughout the flights, with the exception of when they are following polar bear tracks or have initiated a polar bear capture. In addition, USFWS will conduct dedicated monitoring over 1 hour time periods daily and record age group (when possible, but at a minimum pups vs. adult females; adult male bearded seals can be identified) and the type of reaction (i.e., tracking helicopter, moving on ice, entering water, etc.). The other biologist and the pilot will continue searching for polar bears to capture. These flights will continue to occur at 91.4 m (300 ft) altitude. Surveys will occur on days that vary in weather conditions since the number of seals encountered greatly depends on weather, including temperature, cloud cover, and wind speed.

6.2 Reporting Requirements

USFWS will submit a report to NMFS within 90 days of completing the activity. The report will include a description of the activities that were conducted, the methods and results of the ice seal monitoring, marine mammal sightings, estimates of the number of seals encountered, and seal reactions to the activity.

6.3 Conclusions

The inclusion of the mitigation and monitoring requirements in the IHA, as described in the Preferred Alternative, will ensure that the USFWS' activities and the proposed mitigation measures under Alternative 2 (Preferred Alternative) are sufficient to minimize any potential adverse impacts to the human environment, particularly marine mammal species or stocks and their habitat. With the inclusion of the required mitigation and monitoring requirements, NMFS has determined that the proposed activities (described in Section 1.5 of this EA) by the USFWS and NMFS' proposed issuance of an IHA to the USFWS, will result at worst in a temporary modification of behavior (Level B harassment) of some individuals of two species of marine mammals in the Chukchi Sea. In addition, no take by injury, serious injury, and/or death is anticipated or proposed to be authorized.

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