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U.S. FISH AND WILDLIFE SERVICE  
Fairbanks Fish and Wildlife Field Office  
101 12<sup>th</sup> Avenue, Room 110  
Fairbanks, Alaska 99701  
September 3, 2009



Memorandum

To: John Goll, Regional Director, MMS Alaska OCS Region

From: Deborah Rocque, Field Supervisor - U.S. Fish and Wildlife Service,  
Fairbanks Fish and Wildlife Field Office 

Subject: Endangered Species Act, Section 7 Biological Opinion for Beaufort and  
Chukchi Sea Program Area lease sales and associated seismic surveys and  
exploratory drilling

This document transmits the U.S. Fish and Wildlife Service's (Service) Final Biological Opinion (BO) on the Minerals Management Service's (MMS) oil and gas lease sales, and activities that may result from them, in the Beaufort and Chukchi Sea Program Areas, and replaces the BOs for Lease Sales 186, 195, 202, and 193.

The document assesses potential impacts to listed Alaska-breeding Steller's eider (*Polysticta stelleri*), spectacled eider (*Somateria fischeri*), and polar bear (*Ursus maritimus*), the candidate species Kittlitz's murrelet (*Brachyramphus brevirostris*) and yellow-billed loon (*Gravia adamsii*), and the Ledyard Bay Critical Habitat Unit (LBCHU) in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. 1531 et seq.).

MMS has statutory authority to complete its OCS energy development actions as incremental step consultations under the ESA. This BO authorizes activities under the first incremental step (seismic surveys and exploratory drilling) and has considered if future activities that may result from the Action would violate section 7(a)(2) of the ESA; i.e., jeopardize the continued existence of species or destroy or adversely modify critical habitat.

*First Incremental Step – Seismic Surveys and Exploratory Drilling*

Using the information provided by MMS on activities that may occur during seismic surveys and exploratory drilling, the Service analyzed the potential effects of these activities. This analysis considered the current status of species and critical habitat, the environmental baseline, and cumulative effects. As a result of this analysis the Service has determined that it is unlikely that seismic survey and exploratory drilling activities will violate section 7(a)(2) of the ESA. However, adverse effects to listed species are anticipated. Incidental take authorization for listed eiders is provided by this BO. Incidental take and potential impacts from spills are mitigated through the reasonable and

prudent measures and terms and conditions described in the BO. Adverse effects to polar bears are also anticipated, but incidental take authorization is not provided for polar bears by this BO, as incidental take of marine mammals must first be authorized under the Marine Mammal Protection Act.

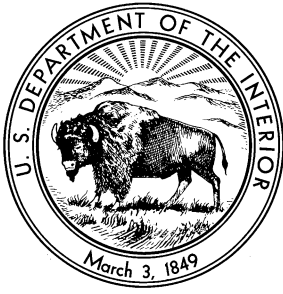
*Future Actions (Development)*

While the type, location, size, and details of any future development activities are unknown, MMS's development scenarios were used to identify the types and potential scale of impacts on species of concern that may result from the Action. Potential adverse effects resulting from development for listed eiders include habitat loss, disturbance and displacement, and collisions, and for polar bears, disturbance and displacement, and an increase in human-polar bear interactions. However, our greatest concern for all species is potential impacts in the event of a large oil spill in marine waters.

These impacts could have significant effects on listed species, particularly if they occur in important habitats such as the spring lead system, the LBCHU, the area around Barrow, or the Barrier Islands. It is possible, that if such a spill were to occur it could jeopardize the continued existence of listed Steller's or spectacled eiders, or destroy or adversely modify the LBCHU.

Depending on the status of species, the environmental baseline, and development activities set in motion by the first incremental step of the Action, and / or depending on what is proposed in later incremental steps, it is possible that a jeopardy opinion could be reached. However, based on the development scenarios provided at this time, we do not believe the impacts that would result in jeopardy or adverse modification are reasonably expected to occur. As you are aware, consultation between MMS and the Service will continue through each phase of any projects proposed for the Beaufort and Chukchi Sea Program Areas. These subsequent consultations will reevaluate the status of species, the environmental baseline, and cumulative effects, as well as impacts from the proposed activity.

A complete administrative record of this consultation is on file at the Fairbanks Fish and Wildlife Field Office, 101 12<sup>th</sup> Ave., Room 110, Fairbanks, Alaska 99701. If you have any comments or concerns regarding this BO, please have your staff contact Ted Swem, Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office at (907) 456-0441.



**FINAL**

**BIOLOGICAL OPINION**

**For**

**BEAUFORT and CHUKCHI SEA PROGRAM AREA**

**LEASE SALES**

**AND**

**ASSOCIATED SEISMIC SURVEYS**

**AND EXPLORATORY DRILLING**

Consultation with the

Minerals Management Service – Alaska OCS Region  
Anchorage, Alaska

September 3, 2009

# TABLE OF CONTENTS

1. Introduction	1
2. Description of the Proposed Action	4
2.1 Introduction	4
2.2 Action Area	4
2.3 Minimization and Mitigation Measures	6
2.4 First Incremental Step	6
2.5 Future Incremental Steps	8
3. Status of Species and Critical Habitat	11
3.1 Spectacled Eider	11
3.2 Steller's Eider	18
3.3 Yellow-billed Loon	22
3.4 Kittlitz's Murrelet	27
3.5 Ledyard Bay Critical Habitat Unit	30
3.6 Polar Bear	32
4. Environmental Baseline	39
4.1 Spectacled and Steller's Eiders	39
4.2 Yellow-billed Loons	47
4.3 Kittlitz's Murrelet	48
4.4 Ledyard Bay Critical Habitat Unit	48
4.5 Polar Bears	49
5. Effects of the Action on Listed Species and Critical Habitat	55
5.1 Introduction	55
5.2 Effects of the First Incremental Step (Seismic Surveys and Exploratory Drilling)	55
5.2.1 Avian Species	55
5.2.2 Ledyard Bay Critical Habitat Unit	64
5.2.3 Polar Bears	65
5.3 Development Scenarios	71
5.3.1 Avian Species and Ledyard Bay Critical Habitat Unit	72
5.3.2 Polar Bears	80
5.4 Indirect Effects	86
5.5 Interrelated and Interdependent Effects	86
6. Cumulative Effects	86
7. Conclusions	88
7.1 Introduction	88
7.2 Conclusion for the First Incremental Step	88
7.2.1 Listed Eiders and Candidate Species	89

7.2.2 Ledyard Bay Critical Habitat Unit	90
7.2.3 Polar bears	90
7.3 Conclusions for the Entire Action	91
8. Incidental Take Statement	94
8.1 Listed Eiders	95
8.2 Polar Bears	98
9. Reasonable and Prudent Measures	101
10. Terms and Conditions	102
11. Conservation Recommendations	103
12. Reinitiation Notice	104
13. Literature Cited	105
Appendix A	133

#### **List of Tables**

Table 4.1 – Activities on Alaska’s North Slope and adjacent areas that required formal section 7 consultations and the amount of incidental take provided.	41
Table 5.1 – Summary of impacts that may occur from activities authorized under the first incremental step of the section 7 consultation for listed and candidate species and the Ledyard Bay Critical Habitat Unit.	71
Table 5.2 – Number of polar bear observations and hazing actions recorded at North Slope and Beaufort Sea oil facilities 2005 – 2008.	83
Table 8.1 – Number of polar bears observed by marine mammal observers during seismic survey and associated vessel activities in the Beaufort and Chukchi seas.	100

#### **List of Figures**

Figure 1.1. Location of the Beaufort and Chukchi Sea Program Areas	2
Figure 3.1 Male and female spectacled eiders in breeding plumage	12
Figure 3.2 Distribution of spectacled eiders	13
Figure 3.3 Spectacled eider density across Alaska’s Arctic Coastal Plain	14

Figure 3.4	Spring migration locations of satellite-transmitted North Slope king eiders, 2002-2006.	16
Figure 3.5	Male and female Steller's eider in breeding plumage	18
Figure 3.6	Steller's eider distribution in the Bering, Beaufort, and Chukchi seas	19
Figure 3.7	Worldwide range of the yellow-billed loon	23
Figure 3.8	Yellow-billed loon breeding distribution in Alaska	24
Figure 3.9	Breeding distribution of the Kittlitz's murrelet in North America	28
Figure 3.10	Representative Chukchi Sea food web with spectacled eider in apex predator functional role.	31
Figure 3.11	Polar Bears	33
Figure 3.12	Range map of Beaufort Sea and Chukchi Sea polar bears stocks	34
Figure 4.1	Blood lead concentrations in incubating female Steller's eiders at Barrow, 1999.	40
Figure 5.1.	Location of eiders observed during aerial surveys in Ledyard Bay in relation to the critical habitat unit boundaries and the Chukchi Sea Program Area.	57
Figure 10.1	Spring Lead System for the purpose of Terms and Conditions	103

## 1. INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA), on effects to listed spectacled eiders (*Somateria fischeri*), Alaska-breeding Steller's eiders (*Polysticta stelleri*), polar bears (*Ursus maritimus*), the Ledyard Bay Critical Habitat Unit (LBCHU), and the candidate species yellow-billed loons (*Gavia adamsii*) and Kittlitz's murrelets (*Brachyramphus brevirostris*), of the Action described below.

The action agency for this consultation is the Minerals Management Service (MMS). MMS has responsibility for the development of oil, gas, and other resources on the United States outer continental shelf (OCS). In Alaska MMS has previously made areas of the Beaufort and Chukchi seas (henceforth referred to as the Beaufort and Chukchi Sea Program Areas) available for leasing in a series of lease sales<sup>1</sup>. MMS has statutory authority (under 43 USC 1331 et. seq.) to complete its OCS energy development actions in a tiered approach for review under the National Environmental Policy Act (NEPA), and use an incremental step consultation process under the ESA as described in regulations at 50 CFR 402.14(k). Therefore, at MMS's request incremental step consultations were conducted for these previous lease sales.

Subsequent to these incremental step consultations, there have been changes in the status of Steller's eiders and the environmental baseline. In addition, the polar bear was listed as a threatened species under the ESA on May 15, 2008 (73 FR 28212, May 2008), and the yellow-billed loon was designated a candidate species under the ESA on March 25, 2009 (74 FR 12932, March 25, 2009).

MMS proposes to conduct additional lease sales in the Chukchi Sea (LS 212 and 221) and Beaufort Sea (LS 209 and 217) Program Areas (Figure 1.1). These new lease sales would make available previous sale areas in the Beaufort and Chukchi seas minus any currently leased areas<sup>2</sup>. Accordingly MMS and the Service have been working together to ensure that section 7 consultations for oil and gas activities in these Program Areas are as current, thorough, and accurate as possible.

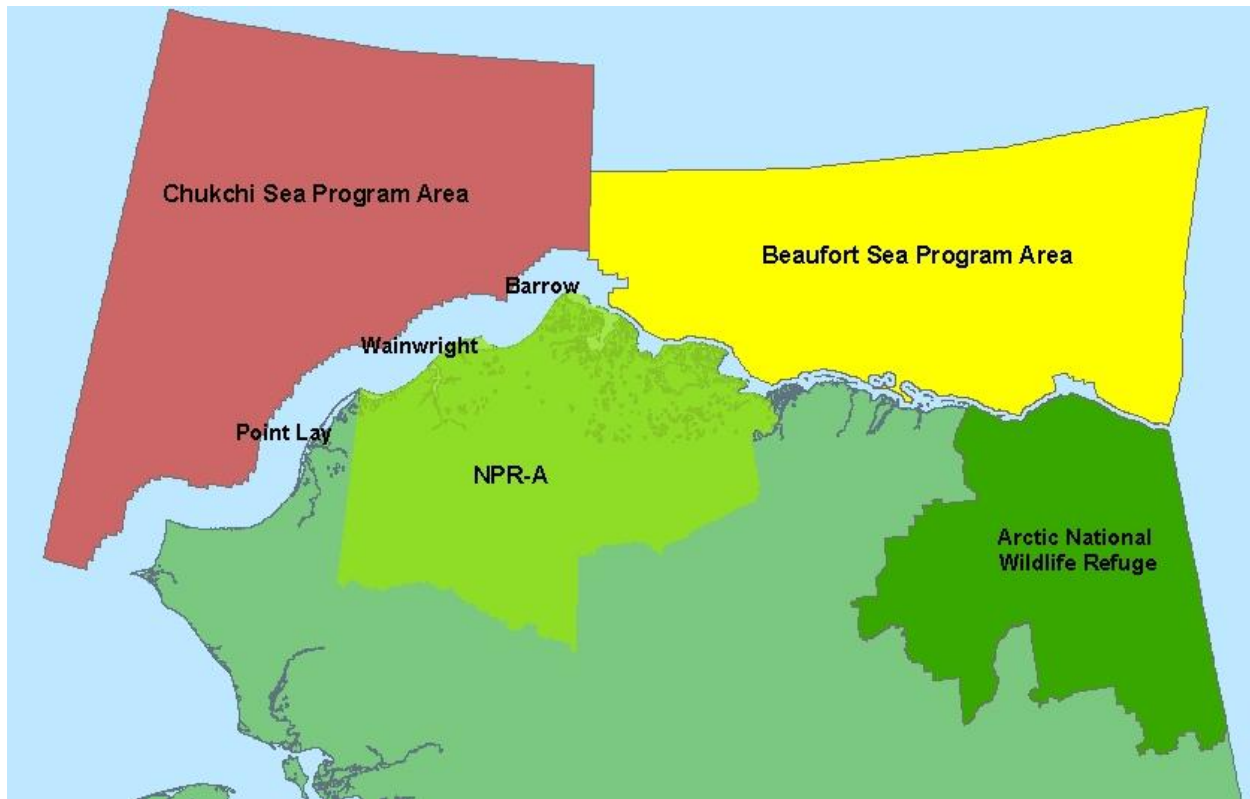
This BO evaluates the potential impacts of potential oil and gas leasing, exploration, and development<sup>3</sup> in the Beaufort and Chukchi Sea Program Areas (the Action) to ESA listed and candidate species and critical habitat. As an incremental step consultation, this BO examines and authorizes activities in the first incremental step (seismic surveys and exploration drilling). It also assesses development activities that may result from the Action, as described by MMS's development scenarios (DS) and their associated mitigation measures. The exploration and development scenarios are described in detail in MMS's Assessment of Effects document (MMS 2009), and MMS's DEIS (MMS 2008) and are summarized in Section 2 of this BO.

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<sup>1</sup> Lease Sales BF, 71, 87, 97, 109, 124, 144, 170, 186, 195, 202, and 193.

<sup>2</sup> At this time, Industry holds approximately 733 leases that have resulted from previous lease sales.

<sup>3</sup> Development includes construction, production, and abandonment of facilities.



**Figure 1.1 – Location of the Beaufort and Chukchi Sea Program Areas**

In accordance with the applicable regulations, this BO includes analysis and conclusions as to whether (1) the incremental step of seismic surveys and exploratory drilling (the first incremental step) would violate section 7(a)(2) of the ESA (i.e., whether these steps would likely jeopardize listed species or destroy or adversely modify critical habitat), and (2) there is a reasonable likelihood that the entire action of potential leasing, exploration, development, production, and field abandonment that may result from the Action would violate section 7(a)(2) of the ESA.

We believe that preparing a single BO for this Action will allow a thorough and comprehensive analysis of all potential impacts to listed species and critical habitat from oil and gas activities in the Program Areas. This comprehensive analysis considers the potential direct and indirect effects of the Action, as well as cumulative effects and effects of interrelated and interdependent activities, when added to and evaluated within the context of the environmental baseline, to provide an aggregative analysis of impacts to listed species and critical habitat. This BO replaces BOs for Lease Sales 193 (USFWS 2007c), 186, 195, and 202 (USFWS 2002a; USFWS 2004; USFWS 2006c).

This BO was prepared using the Draft Environmental Impact Statement for the Beaufort Sea and Chukchi Sea Planning Areas Oil and Gas Lease Sales 209, 212, 217, and 221 (MMS 2008); other information received from MMS in 2008 and 2009; published literature, agency and consultant biological surveys and reports; other information in our files; and personal communication with species experts in the Service and the U.S. Geological Survey (USGS). The complete



administrative record of this consultation is on file at the Service's Fairbanks Fish and Wildlife Field Office.

This BO provides an explanation of the Service's conclusions that the incremental step of seismic surveys and exploratory drilling may adversely affect spectacled and Steller's eiders, and polar bears. However, based on the limited number of listed individuals likely to be affected, and mitigation measures required by MMS during seismic and exploratory drilling activities, the Service also concludes the incremental step of seismic surveys and exploratory drilling is not likely to jeopardize listed species, or destroy or adversely modify designated critical habitat.

As required, the Service evaluated the possible impacts that may result from the entire Action. This analysis was based on MMS's DSs. The Beaufort Sea Program Area DS included one offshore development structure, connected to a shorebase at Point Thompson, Deadhorse, or Cape Simpson by a subsea pipeline, eventually linking to the Trans Alaska Pipeline System (TAPS). The Chukchi Sea Program Area DS described one offshore development platform linked to several undersea drilling well templates. These facilities were connected to a shore base via a subsea pipeline. From the shore base pipelines, communications lines, and a road crossed National Petroleum Reserve-Alaska (NPR-A) to eventually connect with existing oilfield infrastructure.

Based on the best scientific and commercial data available to date, the Service concludes it is not reasonably likely that the entire Action would jeopardize listed species or result in the destruction or adverse modification of critical habitat. This non-jeopardy/non-adverse modification conclusion is based on information provided by MMS that indicates that although possible, population-level impacts are not reasonably likely to occur. Specifically, population-level impacts could occur if infrastructure is placed in areas where large concentrations of listed eiders occur, such as the LBCHU and Chukchi Sea spring lead system. However, given the availability of alternatives, we believe this type of infrastructure placement is unlikely. Our greatest concern for potential population-level impacts is from large marine oil spills that could reach concentrations of listed species, but as we describe in this document we do not believe this is reasonably likely to occur.

This non-jeopardy/non-adverse modification conclusion is based on the low probability of population-level effects occurring. However, as additional information about the nature, location, and timing of proposed oil and gas activities becomes available during this phased leasing, exploration, development, and production process, the Service could later determine that proposed activities are likely to jeopardize listed species or result in destruction or adverse modification of critical habitat, particularly if the status of a listed species declines, or there are large changes in the environmental baseline when development is actually proposed. Actions most likely to lead to jeopardy or destruction/adverse modification conclusions include, for spectacled eiders, oil spills that could result in high mortality during molt in Ledyard Bay or staging in spring leads during spring migration, or that could impact the quantity and quality of the Ledyard Bay invertebrate community, a primary constituent element of designated critical habitat. For Steller's eiders, activities that may result in significant impact include an oil delivery pipeline landfall sited at Barrow that could result in substantial loss of Steller's eider

nesting habitat, and oil spills that could result in high mortality of migrating Steller's eiders in spring leads or adjacent nearshore waters. Significant impacts to polar bears could result from development on or proximal to barrier islands, terrestrial denning habitat, and from oil spills which reach areas where relatively large numbers of polar bears occur such as Cross and Barter Islands.

Regulations at 50 C.F.R. 402.14(k) state that upon issuance of the biological opinion, the Federal agency may proceed with or authorize the incremental steps of the action if the following five requirements are met:

1. The BO does not conclude that the incremental step would violate section 7(a)(2) of the ESA (i.e., it is not likely to jeopardize listed species or result in the destruction or adverse modification of critical habitat);
2. The action agency continues consultation with respect to the entire action, and obtains BOs, as required, for each incremental step;
3. The action agency fulfills its continuing obligation to obtain sufficient data upon which to base the final BO on the entire action;
4. The incremental step does not violate section 7(d) of the ESA concerning the irreversible or irretrievable commitment of resources; and
5. There is a reasonable likelihood that the entire action will not violate section 7(a)(2) of the ESA.

## **2. DESCRIPTION OF THE PROPOSED ACTION**

### **2.1 Introduction**

This section of the BO describes the Action Area, activities under the first incremental step of seismic surveys and exploratory drilling, and activities that may occur under the entire Action including future development, production, and abandonment.

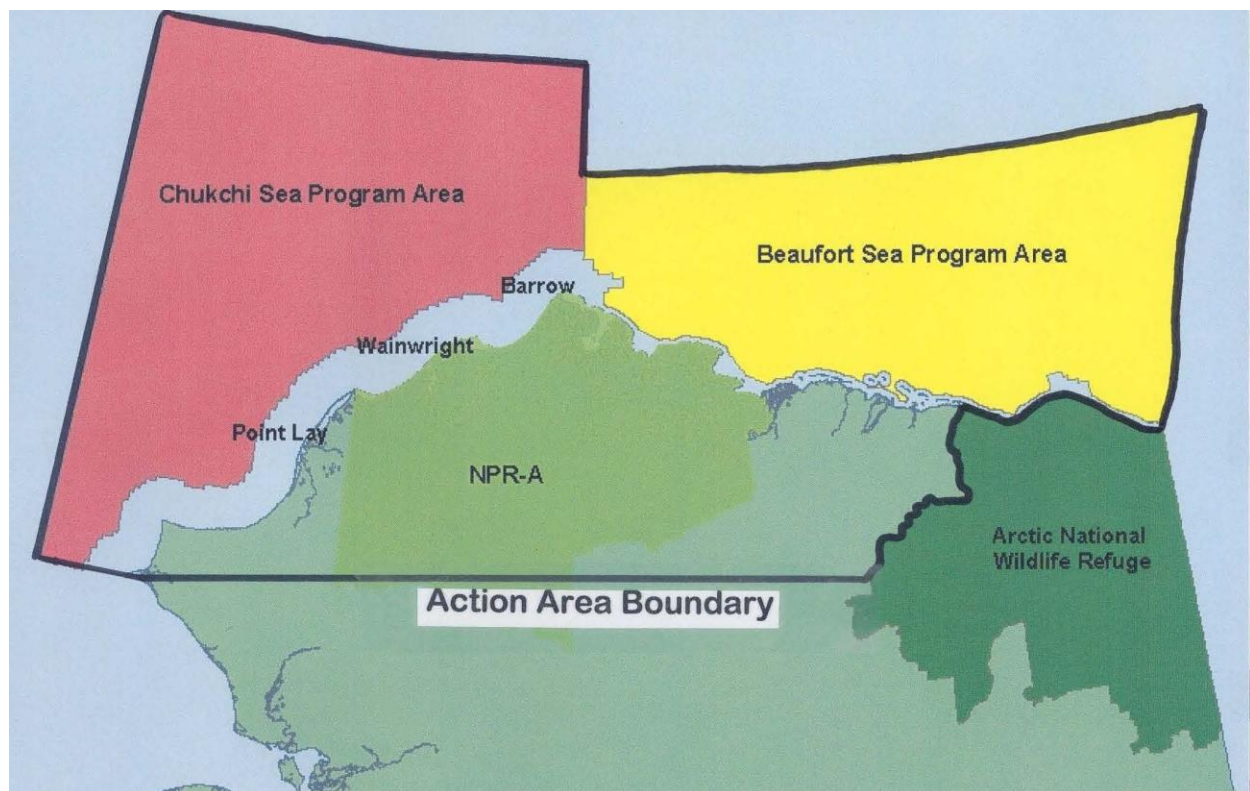
The information in this section is based on reasonable hypothetical development scenarios (DS) prepared by MMS, based on MMS's consideration of the petroleum potential of the area, available technology, and industry trends in developing hydrocarbon resources. A complete description of the assumptions that underlie the development scenarios can be found in MMS's DEIS (MMS 2008).

### **2.2 Action Area**

The Action Area is the geographic region in which direct and indirect effects of the Action may occur. Exploration and development is projected to occur in the Beaufort Sea and Chukchi Sea Program Areas, which are a subset of the larger Beaufort and Chukchi Sea Planning Areas. The Beaufort Sea Program Area includes approximately 33.2 million acres of the Beaufort Sea from

Barrow east to the Alaska–Canada border. The Chukchi Sea Program Area covers approximately 40.2 million acres of the Chukchi Sea from the US–Russia Maritime border west of Point Hope to the edge of the Beaufort Sea Program Area at Barrow.

- The Action Area is broader than the Program Areas, as structures resulting from the Action could be constructed in marine waters outside the Program Areas (e.g., platform-to-shore pipelines) and on land for shore facilities, pump stations, and a pipeline connecting to the Trans Alaska Pipeline System (TAPS). Because the specific location of future development is unknown, we have broadly defined the Action Area (Figure 2.1) to include:
  - The Chukchi and Beaufort Program Areas;
  - Marine waters between the eastern boundary of the Chukchi Sea Program Area and the Alaskan coastline;
  - Marine waters between the southern boundary of the Beaufort Sea Program Area and the Alaskan coastline;
  - The North Slope of Alaska from Point Hope north to the Beaufort Sea, and east to the western boundary of the Arctic National Wildlife Refuge; and
  - Areas identified by MMS's spill trajectory model as being potentially affected by large oil spills.



**Figure 2.1 – Map of the Action Area**

## **2.3 Minimization and Mitigation Measures**

The DS impose a number of restrictions in the form of lease stipulations on activities in connection with the Action. The stipulations determine how these activities will actually take place. Stipulations will likely reduce impacts to listed species. Therefore, they are provided in Appendix A, and are considered part of Action.

## **2.4 First Incremental Step**

The activities in the first incremental step are seismic surveys and exploratory drilling.

### *Seismic Surveys*

It is reasonable to assume when companies buy leases they will explore the lease tracts with a view to development. Although the exact survey protocol will vary depending on factors such as water depth and subsurface geology, the following narrative summarizes likely seismic activities.

Airguns are the acoustical source for 2- and 3-Dimensional (2-D and 3-D) seismic surveys. A combination of airguns (called an array) with a total size of 1,800-6,000 in<sup>3</sup> emitting pulsed sound could be used. In 3-D surveys, primary seismic vessels are generally between 70 and 90 m long and tow one to three source arrays in parallel 50-200 m behind the vessel. The array is activated every 10-15 seconds. Following the source arrays by another 100-200 m are multiple (4-12) streamer-receiver cables each of which can be 3-8 km long. The receiver cables can spread out over a width of 400-900 m and support passive listening equipment in the form of multiple hydrophone elements. The streamer cables contain biodegradable liquid paraffin for buoyancy, although solid / gel streamer cables are also available. 2-D surveys often use smaller vessels, may only tow a single hydrophone streamer, and they have wider spaced track lines than 3-D surveys. Seismic vessels typically operate day and night, and a survey may continue for weeks or months depending upon the size of the survey area. Seismic vessels are often accompanied by one or more support vessels that assist with maintenance and resupplying. Occasionally helicopters may also be used for vessel support and crew changes. Ocean-bottom cable surveys and high resolution site clearance surveys may be conducted, which require the use of additional small utility vessels. High-resolution, low-energy geophysical and ancillary studies required for drilling permits may also be conducted using similar methods.

MMS requires that seismic vessels employ marine mammal observers to monitor the area around vessels for marine mammals and trigger shutdowns of seismic airguns to minimize impacts to these animals. In addition, marine mammal surveys are conducted by aircraft flying at or above 1,500-feet (unless unsafe to do so). Concentrations of marine mammals, such as polar bears, are identified and seismic work is modified to avoid impacts to them. If vessels transit through the Chukchi Sea spring lead system before June 10, where concentrations of listed eiders may occur, wildlife hazing equipment must be pre-staged and be readily accessible by personnel trained in their use, either on the vessel or at Point Lay or Wainwright, or on an on-site oil-spill-response vessel to ensure rapid deployment in the event of a spill. Seismic survey vessels are also required to minimize the use of high intensity lights in an effort to avoid attracting waterfowl that may result in collisions of listed eiders.

In the Beaufort Sea approximately 92,000 line miles of 2-D surveys were carried out between 1965 and 1997 (MMS 2008). Therefore, MMS anticipates most future surveys will be 3-D surveys, likely focused on drilling targets. MMS anticipates a maximum of 6 concurrent seismic surveys could occur in the Beaufort Sea in an open water season (approximately July – October).

It is also possible that winter hardwater surveys may occur on landfast ice in the Beaufort Sea between January and May. After checking ice to ensure it is thick enough to allow operations, Forward Looking Infra Red surveys to detect polar bear dens, and pre-construction activities occur in January, data acquisition usually commences in mid-February. Lines of sensors are placed on ice along with a source line along which the vibrators (seismic sources) moves. Typically a 3-D hardwater survey can cover up to 10 linear miles/day, while a 2-D hardwater survey can cover up to 40 linear miles/day. These activities are supported by a temporary field camp which is transported and housed on 35-40 sled trailers. Prior to the onset of hardwater surveys, operators are required by MMS to obtain authorization under the Marine Mammal Protection Act from the Services Marine Mammals Management Office (MMM Office). Typically operators have been required to conduct polar bear den searches. If a den is located, activities are modified where necessary to provide a 1 mile radius, or as determined by the Service's MMM office, buffer around a den site to avoid impacts to denning polar bears.

Approximately 80,000 miles of 2-D surveys were conducted in the Chukchi Sea from 1970 to 1990. Therefore, MMS anticipates subsequent seismic surveys in this area will be 3-D surveys. Due to the water depth and nature of the area, seismic surveys will only occur in the open water period (approximately July – November). MMS anticipates a maximum of 6 concurrent seismic surveys could occur in the Chukchi Sea each year. To prevent impacts to molting spectacled eiders, seismic surveys and survey support vessels are not permitted in the Ledyard Bay Critical Habitat Unit (LBCHU) after July 1 in any year.

#### *Exploratory Drilling*

Exploratory drilling is also reasonably a component of the first incremental step of the Action. Exploratory drilling determines the presence and amount of hydrocarbon reserves prior to development. Each exploratory well takes between 30 and 90 days to drill depending upon reservoir depth and geology of the area. Rock cuttings from the well drilling are discharged. Drilling muds will be reconditioned and an estimated 80% will be reused, including all the synthetic drilling fluids. The remaining 20%, typically composed of EPA Type 2 Lignosulfonate Mud, will likely be discharged at the drill site subject to Federal and State water quality regulations. Drillships and support vessels are subject to lighting protocols that aim to minimize the likelihood that migrating birds, including listed eiders, will strike these structures.

In the Beaufort Sea, exploratory drilling could be conducted in both the open water season from drillships, or in areas of shallow water (<10 m) from ice islands. Ice platforms are constructed by continuously flooding an area of landfast ice until a platform of ice has been created that is resting on the sea floor, the ice island then serves as a temporary construction platform. This process can only be used in areas where ice movement is minimal, such as landfast ice, in protected areas near barrier islands, or in shallower State waters from where directional drilling could be performed. While MMS notes a maximum of two mobile drillrigs may operate during

each winter season, as there are few areas this technique could be used and to date no exploratory drilling from an ice platform has actually been performed in the Beaufort Sea, MMS considers open water exploratory drilling to be much more likely.

MMS estimates up to two drillships could operate in the Beaufort Sea during each open water season. Each rig could drill a maximum of four wells per season, and MMS estimates at most 34 wells could be drilled in the Beaufort Sea Program Area through 2022. Drillships would be accompanied by an unspecified number of support vessels. Helicopters could be used to transport personnel and supplies from a shorebase to the drilling facilities.

Due to the depth of water, only drillships or ice-strengthened jack-up rigs are likely to be used to drill exploratory wells in the Chukchi Sea. MMS estimates a maximum number of two drillships/ rigs could operate in the Chukchi Sea. Each ship could drill a maximum of four wells per season, and MMS estimates a maximum of 36 wells could be drilled in the Chukchi Sea Program Area. However, because the cost of drilling a single well is approximately \$50 million, 36 wells is likely an overestimate. Drillships/rigs in the Chukchi Sea will be attended by one or two ice breakers and other support vessels and supply ships. Helicopters could be used to transport personnel and supplies from a shorebase to the vessels.

## **2.5 Future Incremental Steps**

In this section we describe MMS's DS for both the Chukchi and Beaufort Program Areas. A 2006 assessment by MMS (MMS 2008) estimated the Chukchi and Beaufort Sea Planning Areas could contain technically recoverable resources of 23 billion barrels of oil and 105 trillion cubic feet of gas. However, despite these potential resources no offshore development has occurred to date in the Chukchi Sea, and offshore facilities are rare in the Beaufort Sea. MMS notes that while the high petroleum resource potential will continue to attract industry interest, development is unlikely to occur unless some of the economic and engineering challenges can be ameliorated (MMS 2008). Of the 929 blocks leased since 1979 in the Beaufort Sea, only 0.01% have been commercially successful. In the Chukchi Sea, 5 exploration wells were drilled and although hydrocarbons were identified these leases expired. While no development has occurred in the Chukchi Sea Program Area, industry interest in the area is high, as evidenced by the record bids received in Lease Sale 193 in 2008.

As described above, in order to evaluate if future activities that may result from the Action will violate section 7(a)(2) and for other environmental analysis MMS has DSs for each Program Area. In summary, these DS assume the TAPS will remain in operation and transport oil from fields in northern Alaska, including any produced in the Chukchi and Beaufort Program Areas. Although there is currently no infrastructure to export gas from Alaska's North Slope area to market, there is considerable interest in developing a gas pipeline project. MMS has, therefore, included a generic-gas development scenario in their DSs. Much of the infrastructure and activities are similar regardless of whether the field produces oil, gas, or a mixture of both. It is likely that oil would be produced first, as it can be shipped to market via TAPS, while the gas is re-injected to aid oil recovery. Gas production is likely to occur much later in time after a gas transportation system (anticipated to be via pipelines) has been constructed.

### *Beaufort Sea*

MMS estimates a 67% probability of future development occurring in the Beaufort Sea Program Area (MMS 2009). The most likely development outcome, and hence the one analyzed in this BO, assumes three fields ranging in size from 125-250 MMbbl with a combined production of 500 MMbbl of oil (or 3,000 Bcf of gas) could be discovered and developed through one new offshore production facility. MMS estimates these fields could produce hydrocarbons until 2038.

The fields could be located anywhere in the Program Area, but are more likely to be located in shallower water and near existing infrastructure. Smaller fields are more likely to be developed if they are close to existing infrastructure, and may even be developed from it (e.g., like the Liberty project); while fields further from infrastructure, or in deeper water, have to be larger to be economical viable.

The new production facility could vary in form depending upon its location. In shallow water (< 15 m) an artificial gravel island could be constructed (e.g., like Northstar); in waters 15 – 50 m deep a bottom founded, pack-ice resilient, platform would be constructed; while in waters deeper than 50 m subsea wells tied back to a platform in shallower waters could be used. Oil / gas from the production platform could be transported to shore via a trenched subsea pipeline.

At landfall the pipeline may be elevated on a short causeway to protect against coastal erosion before continuing to a processing facility aboveground on vertical support members for oil, or buried for gas. A gravel road may be constructed along the pipeline. Where possible a new development would likely use existing pipelines and processing facilities. While landfall could occur anywhere along the Beaufort Sea coast, MMS anticipates projects in the central Beaufort will likely tie into existing Deadhorse area facilities at either Endicott, Milne Point, or Northstar; projects in the eastern Beaufort Sea would likely result in a new landfall in the Point Thompson area; while Cape Simpson may serve as a landfall for developments in the western Beaufort Sea with an overland pipeline through NPR-A to Kuparuk.

MMS anticipates development could require construction of a 50 acre shore base and staging facilities, two pump stations of 40 acres in size, and up to 50 miles of new road. The shorebase would require access to an airstrip. At Cape Simpson and Deadhorse airstrips already exist, so only the Point Thompson shorebase alternative would require construction of a new airstrip. Gravel material for these facilities would be mined from upland material sites where possible, although coastal areas such as barrier islands and intertidal areas may also be mined. The total terrestrial development footprint is estimated at 845 acres (3.41 km<sup>2</sup>), and an additional 10 acres (0.04 km<sup>2</sup>) at Point Thompson for an airstrip.

Construction of the offshore platform and subsea pipelines may take place in the summer open water season, or in winter once land fast ice has stabilized. Heavy equipment, materials, and modules for both the onshore and offshore facilities would likely be transported by barge (estimated at 2 trips / year) and possibly via winter ice road. MMS also estimates that three helicopter flights / day to and from the offshore facility and 1–3 support vessel trips from West Dock or a similar location each week would occur during construction of offshore facilities.

Construction of the onshore pipeline and excavation of gravel material would likely be winter operations. In addition to the barge trips, materials for the shore base and other terrestrial structures may be transported via an estimated five C-130 aircraft flights / week. MMS estimates project construction may last three years.

Once in production, MMS anticipates up to 3 helicopter flights / day between the shore base and offshore platform, 2 additional aircraft flights each day to the shorebase, and 1 support vessel trip to and from the offshore platform every 1 – 2 weeks during open water season. Ice roads may be constructed on an as needed basis, and 2 barge trips/year for 6 years to remove spent drilling muds from the offshore platform. Well workovers would likely be made at 5-10 year intervals to restore production flow rates. Pipelines would be inspected and cleaned regularly using Pipeline Inspection Gauges (PIGS).

MMS anticipates the lifespan of this project (exploration through production), if it occurs would be 30-40 years. Field life could be extended if the platform and wells are used for gas production after oil reserves are depleted. After production abandonment operations would commence and would be expected to last two years for each field. Typically wells are permanently plugged and wellhead equipment removed. Pipelines are cleaned, plugged at both ends, and are left in place. The platform would likely be completely or partially removed and the seafloor returned to some practicable, predevelopment condition. Onshore structures would undergo a similar process, although they may be used by other, future projects.

#### *Chukchi Sea*

There is no oil and gas infrastructure close to the Chukchi Sea; therefore, for development to occur in this remote area, a very large field of oil would have to be found and developed. MMS estimates there is only a 27% probability that development would occur (MMS 2009). Were development to occur, the most likely development outcome, assumes a 1 Bbbl field would have to be found and developed through one new production facility. This field could be located anywhere in the Program Area.

The offshore production facility (central platform) is likely to be an ice-resistant bottom-founded platform. The platform would support drillrigs, processing equipment, fuel-and-production storage capacity, and personnel quarters. MMS estimates 50% of production could come from subsea wells arranged in templates of 4. Production from these templates would be moved to the central platform for processing via subsea pipelines. At the central platform gas would be separated from oil and water and either re-injected or used for fuel. Shallow wells from the central platform could be used to dispose of waste water and drilling mud and cuttings. From the central platform subsea pipes could transport oil, and possibly gas at a later date, to shore.

At the coast, a new shorebase and staging facilities would be constructed to support offshore operations and serve as the first pump station. The location of the shorebase is unknown, but MMS considers the likely location between Icy Cape and Point Belcher, near Wainwright. From the shorebase, vertical supports would suspend communication cables and oil pipelines approximately 300 miles east to connect to existing North Slope oilfield infrastructure. A chilled high-pressure gas pipeline could be buried in the same corridor, and MMS anticipates a 65-foot



wide road would be constructed along the pipeline corridor. Four pump / compressor stations (each 40 acres in size) would probably be build along the route. Gravel for building these facilities would likely come from currently unknown gravel deposits along the route, or possibly from coastal areas. The estimated footprint of terrestrial development in this DS is 4,291 acres (17.37 km<sup>2</sup>).

MMS estimates it may take 4-5 years to design, fabricate, and install project facilities. The offshore central platform would likely be constructed in large sections which would be transported to the site by boat, before they are mated together. Subsea templates and pipelines could also be installed in summer open-water season. During construction MMS estimates up to 3 helicopter flights per day and 3 support vessel trips per week would be made to the central platform site, either from the shorebase or from Barrow. Heavy equipment and other materials for construction would likely be transported to the shorebase site via barges (estimated at 2/year) and aircraft (5 C-130 flights/week).

In the production phase the number of helicopter trips to the production platform would likely remain the same, while vessel traffic would drop to 1 trip every 1-2 weeks. Two barge trips / year for 6 years may also be required to remove cuttings and spent mud from the subsea templates and central platform. Two daily aircraft flights are expected at the shorebase and ice roads may be constructed as needed. Well workovers would likely be made at 5-10 year intervals to restore production flow rates. Pipelines will be inspected and cleaned regularly using PIGS.

MMS anticipates oil production could last 15-25 years, after which gas production may occur if a gas-export system from the North Slope is in place. Gas production may extend the life of the facilities by 20 years. After this wells would be plugged and wellhead equipment removed. Pipelines are cleaned, plugged at both ends, and are left in place on the seafloor. The platform is likely to be completely or partially removed and the seafloor returned to some practicable, predevelopment condition. Onshore structures undergo a similar process, although they may be used for other activities.

### **3. STATUS OF SPECIES**

This section presents biological and ecological information relevant to formation of the BO. Appropriate information on the species' life history, habitat and distribution, and other factors necessary for their survival is included for analysis in later sections. A description of the status of the Ledyard Bay Critical Habitat Unit (LBCHU) is also included.

#### **3.1 Spectacled Eider**

##### *Physical Appearance*

Spectacled eiders are large sea ducks. Males in breeding plumage have a white back, black breast, and pale green head with large white "spectacles" around the eyes. In late summer and autumn males molt into a mottled brown plumage that lasts until late fall, when they re-acquire

breeding plumage. Females are mottled brown year round, with pale tan spectacles. Juveniles attain breeding plumage in their second (female) or third (male) year; until then they are mottled brown (Petersen et al. 2000). Both males and females have long sloped bills, giving them a characteristic profile (Figure 3.1).

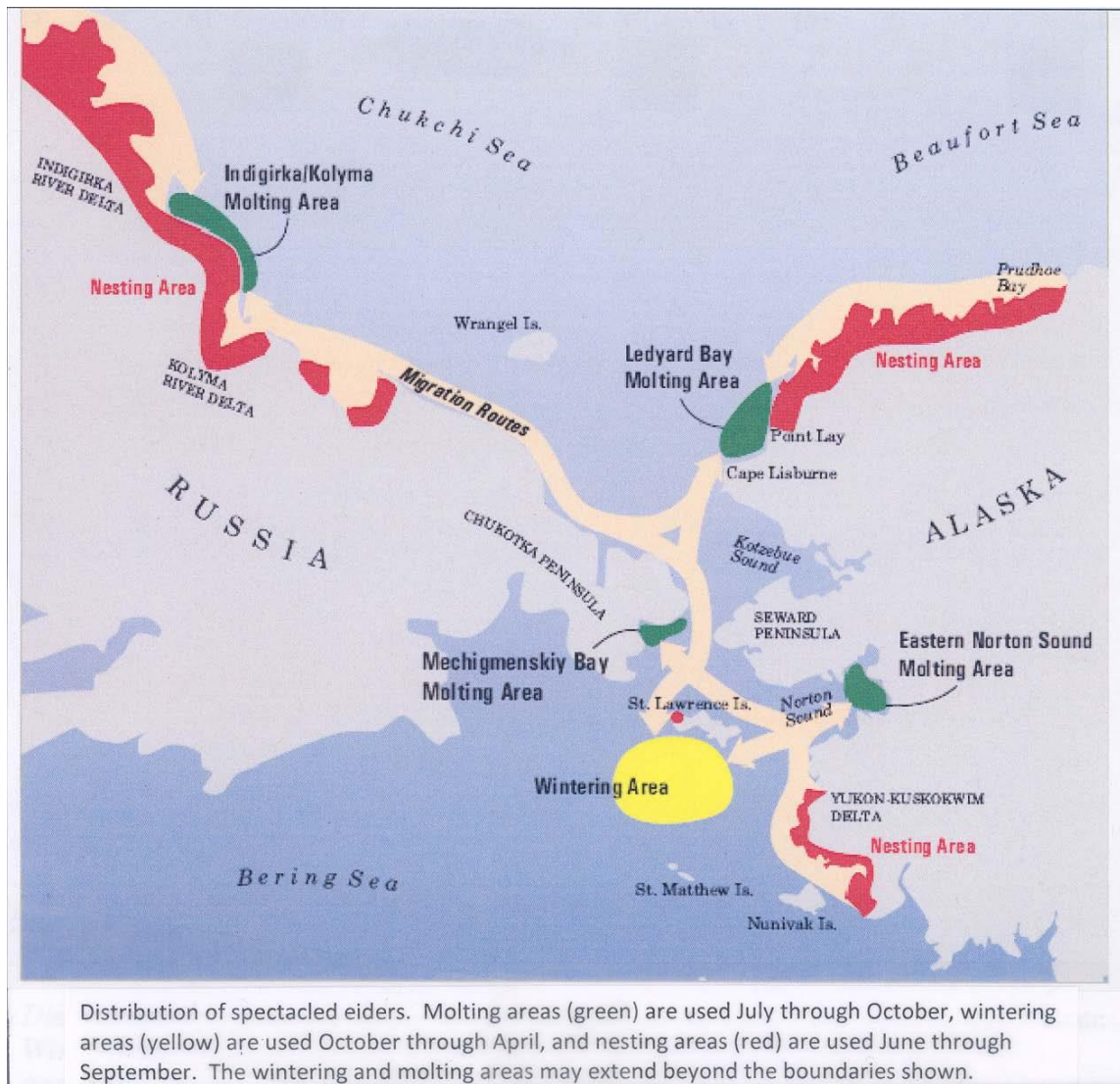


**Figure 3.1 - Male and female spectacled eiders in breeding plumage.**

#### *Distribution and Status*

Spectacled eiders inhabit the North Pacific. There are three primary breeding populations; those on Alaska's North Slope, the Yukon-Kuskokwim Delta (Y-K Delta), and northern Russia. The entire species was listed throughout its range as threatened on May 10, 1993 (Federal Register 58(88):27474-27480) because of documented population declines. The Y-K Delta population had declined 96% between the 1970s and early 1990s (Stehn et al. 1993, Ely et al. 1994), and anecdotal information indicated that populations in the other two primary breeding areas had also declined (USFWS 1996).

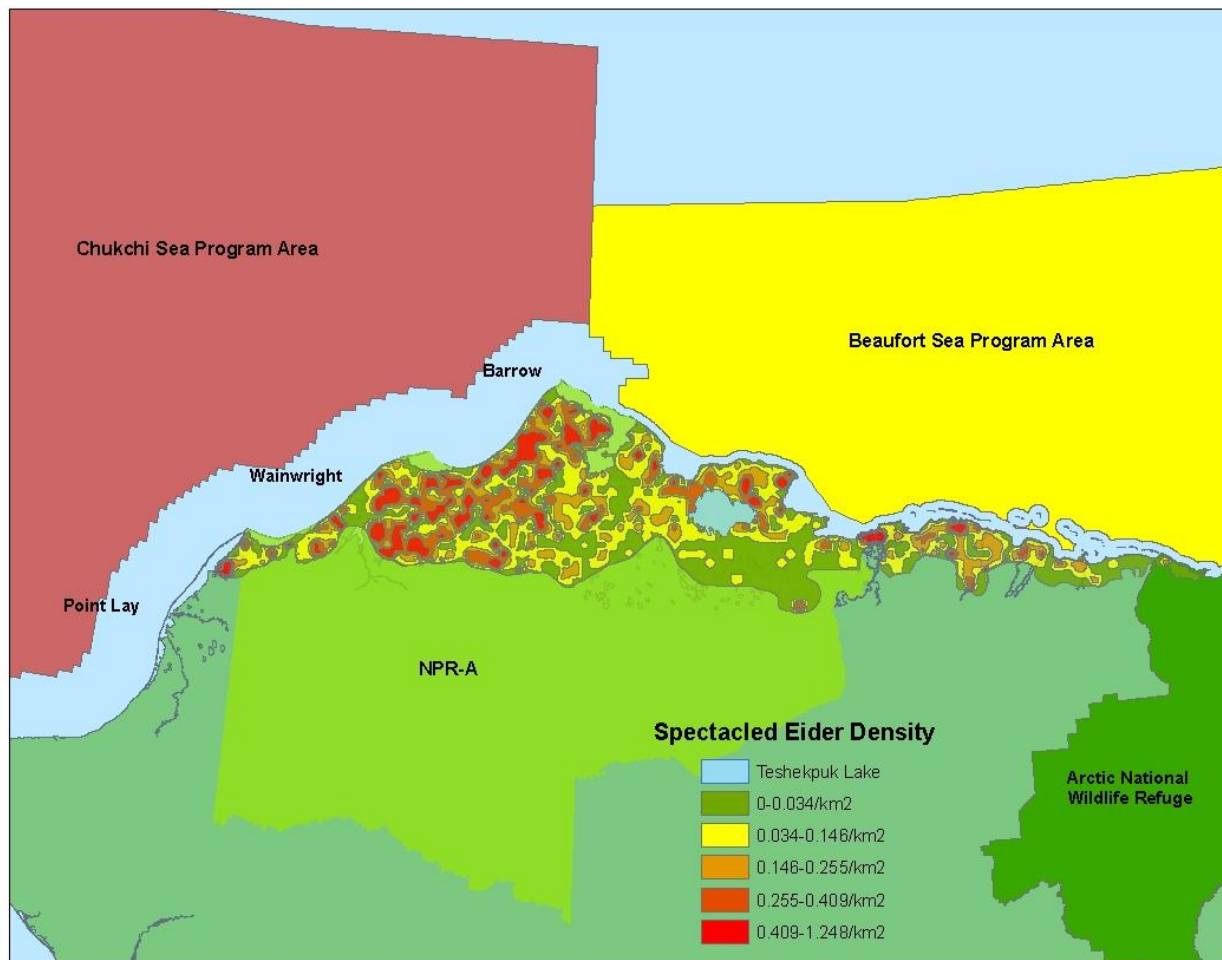
Spectacled eiders molt in several discrete areas (Figure 3.2), with birds from the different populations and genders apparently favoring different molting areas (Petersen et al. 1999). After molting, spectacled eiders migrate to openings in pack ice of the central Bering Sea south/southwest of St. Lawrence Island (Petersen et al. 1999) (Figure 3.2), where they remain until March and April (Lovvorn et al. 2003).



**Figure 3.2 - Distribution of spectacled eiders (USFWS 2002a).**

#### *Life History – North Slope Population (Breeding)*

Research and spring aerial surveys have provided data on spectacled eider populations on Alaska's Arctic Coastal Plain (ACP) (the "North Slope" breeding population) since 1992. Breeding density varies across the North Slope (Figure 3.3). Breeding pair numbers peak in mid-June and the number of males declines 4-5 days later (Smith et al. 1994, Anderson and Cooper 1994, Anderson et al. 1995, Bart and Earnst 2005).



**Figure 3.3 – Spectacled Density across Alaska’s Arctic Coastal Plain**

North Slope spectacled eider clutch size averages 3.2-3.8, with clutches of up to eight eggs reported (Quakenbush et al. 1995). Incubation lasts 20-25 days (Kondratyev and Zadorina 1992, Harwood and Moran 1993, Moran and Harwood 1994, Moran 1995), and hatching occurs from mid- to late July (Warnock and Troy 1992). On the nesting grounds, spectacled eiders feed on mollusks, insect larvae (crane flies and caddisflies), midges, small freshwater crustaceans, and plants and seeds (Kondratyev and Zadorina 1992) in shallow freshwater or brackish ponds, or on flooded tundra. Young fledge approximately 50 days after hatch, and then females with broods move directly from freshwater to marine habitats.

Nest success is variable and greatly influenced by predators, including gulls (*Larus* spp.), jaegers (*Stercorarius* spp.), and red (*Vulpes vulpes*) and arctic (*Alopex lagopus*) foxes. In Arctic Russia, apparent nest success was calculated as <2% in 1994 and 27% in 1995; predation was believed to be the cause of high failure rates, with foxes, gulls and jaegers the suspected predators (Pearce et al. 1998). Apparent nest success in 1991 and 1993-1995 in the Kuparuk and Prudhoe Bay oil fields on the North Slope varied from 25-40% (Warnock and Troy 1992, Anderson et al. 1998).

### *Life History – North Slope Population (Non-breeding)*

Males generally depart breeding areas when the females begin incubation in late June (Anderson and Cooper 1994, Bart and Earnst 2005). Use of the Beaufort Sea by departing males is variable. Some appear to move directly to the Chukchi Sea over land, while the majority moved rapidly (average travel of 1.75 days), over nearshore waters from breeding grounds to the Chukchi Sea (TERA 2002). Of 14 males implanted with satellite transmitters, only four spent an extended period of time (11–30 days), in the Beaufort Sea (TERA 2002). Preferred areas for males appeared to be near large river deltas such as the Colville River where open water is more prevalent in early summer when much of the Beaufort Sea is still frozen.

Females generally depart the breeding grounds later, when much more of the Beaufort Sea is ice-free, allowing for more extensive use of the area. Females spent an average of two weeks in the Beaufort Sea (range 6-30 days) with the western Beaufort Sea the most heavily used (TERA 2002). Females also appeared to migrate through the Beaufort Sea an average of 10 km further offshore than the males (Peterson et al. 1999). Moving further offshore and the greater use of the Beaufort Sea by females were attributed to the greater availability of open water when females depart the area (Peterson et al. 1999, TERA 2002).

Spectacled eiders use specific molting areas from July to late October. Larned et al. (1995) and Peterson et al. (1999) discussed spectacled eiders' apparent strong preference for specific molting locations, and concluded that all spectacled eiders molt in four discrete areas (Figure 3.2). Females generally used molting areas nearest their breeding grounds. All transmittered females from the Y-K Delta molted in nearby Norton Sound (n=18), while females from the North Slope (n=15) molted in Ledyard Bay (10), along the Russian coast (4), and near St. Lawrence Island (1). Males did not show strong molting site fidelity; males from all three breeding areas molted in Ledyard Bay, Mechigmentskiy Bay, and the Indigirka/Kolyma River Delta. Males reached molting areas first, beginning in late June, and remained through mid-October. Non-breeding females, and those that nested but failed, arrived at molting areas in late July, while successfully-breeding females and young of the year reached molting areas in late August or September and remained through October.

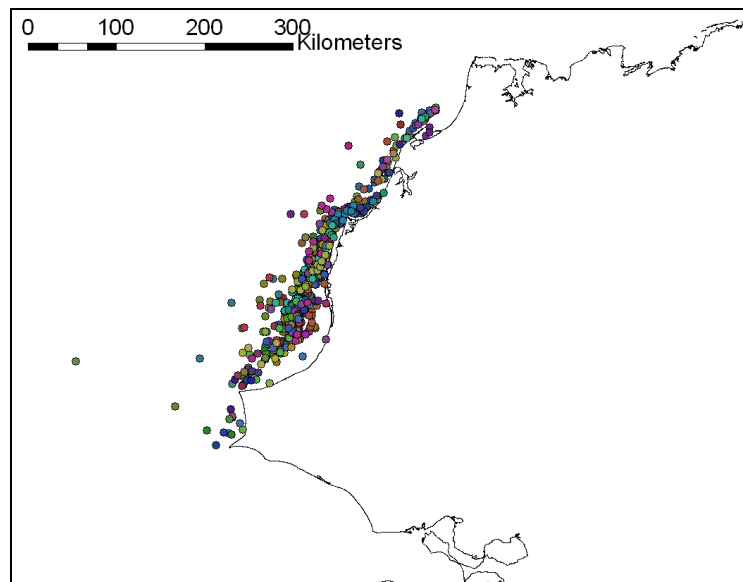
Avian molt is energetically demanding, especially for species such as spectacled eiders that complete molt in a few weeks. Molting birds must have ample nutritious food sources, and the rich benthic community of Ledyard Bay (Feder et al. 1989, 1994a, 1994b) likely provides these for spectacled eiders. Large concentrations of spectacled eiders molt in Ledyard Bay to utilize this food resource; aerial surveys on 4 days in different years counted 200 to 33,192 molting spectacled eiders in Ledyard Bay (Petersen et al. 1999; Larned et al. 1995). The environmental characteristics of Ledyard Bay are described in the *Ledyard Bay Critical Habitat Unit* section below.

After molting, spectacled eiders migrate offshore in the Chukchi and Bering Seas to a single wintering area in openings in pack ice of the central Bering Sea south/southwest of St. Lawrence Island (Figure 3.2). In this relatively shallow area, hundreds of thousands of spectacled eiders (Petersen et al. 1999) rest and feed, diving up to 70 m to eat bivalves, mollusks, and crustaceans (Cottam 1939, Petersen et al. 1998, Petersen and Douglas 2004). Twelve spectacled eiders



collected in the Bering Sea wintering area in March 2001 contained primarily the bivalve *Nuculana radiata* (Lovvorn et al. 2003).

Although migratory movements between the wintering area and the North Slope are poorly understood, it is likely that spectacled eiders follow open water in order to rest and feed en route. Recent information about spectacled and other eiders indicates that they probably make extensive use of the eastern Chukchi spring lead system between departure from the wintering area in March and April and arrival on the North Slope in mid-May or early June. Limited spring aerial observations in the eastern Chukchi have documented dozens to several hundred common (*Somateria mollissima*) and spectacled eiders in spring leads and several miles offshore in relatively small openings in rotting sea ice (William Larned, USFWS; James Lovvorn, University of Wyoming, pers. comm.). Woodby and Divoky (1982) documented large numbers of king (*Somateria spectabilis*) and common eiders using the eastern Chukchi lead system, advancing in pulses during days of favorable following winds, and concluded that an open lead is probably requisite for the spring eider passage in this region. Information obtained in 2002-2006 about 57 satellite-transmitted king eiders found that 100% of the birds migrating from the Bering Sea to breeding grounds in North America occupied the spring lead system in the eastern Chukchi (Fig. 3.4) for approximately 3-4 weeks (Steffen Oppel, University of Alaska-Fairbanks, unpubl. data).



**Figure 3.4. Spring migration locations of satellite-transmitted North Slope king eiders, 2002-2006 (Data from Steffen Oppel, University of Alaska-Fairbanks).**

Adequate foraging opportunities and nutrition during spring migration are critical to spectacled eider productivity. Like most sea ducks, female spectacled eiders do not feed substantially on the breeding grounds, so produce and incubate their eggs while living off body reserves (Korschgen 1977, Drent and Daan 1980, Parker and Holm 1990). Clutch size, a measure of reproductive potential, was positively correlated with body condition and reserves obtained prior to arrival at breeding areas (Coulson 1984, Raveling 1979, Parker and Holm 1990). Body

reserves must be maintained from winter or acquired during the 4-8 weeks (Lovvorn et al. 2003) of spring staging, and Petersen and Flint (2002) suggest common eider productivity on the western Beaufort Sea coast is influenced by conditions encountered in May to early June during their spring migration through the Chukchi Sea (including Ledyard Bay). Common eider female body mass increased 20% during the 4-6 weeks prior to egg laying (Gorman and Milne 1971, Milne 1976, Korschgen 1977, Parker and Holm 1990). For spectacled eiders, average female body weight in late March in the Bering Sea was  $1,550 \pm 35$  g (n=12), and slightly (but not significantly) more upon arrival at breeding sites ( $1,623 \pm 46$  g, n=11) (Lovvorn et al. 2003), indicating that spectacled eiders must maintain or enhance their physiological condition during spring staging.

### *Abundance and Trends*

The most recent range wide estimate of the total number of spectacled eiders was 363,000 (333,526-392,532 95% CI), obtained by aerial surveys of the known wintering area in the Bering Sea in late winter 1996-1997 (Petersen et al. 1999). Although a modeling exercise estimated the global population could theoretically be as high as 612,120 (Stehn et al. 2006).

For the North Slope breeding population, the most recent (2002-2006) population index<sup>4</sup> of 6,458 (5,471-7,445 95% CI) was adjusted by a factor that accounts for the number of nests missed during aerial surveys<sup>5</sup> (developed on the Y-K Delta) and used to calculate a North Slope breeding spectacled eider population estimate of 12,916 (10,942-14,890 95% CI), 2002-2006 (Stehn et al. 2006). The spectacled eider population size from 1993-2006 was stable, with an average (n=14) annual growth rate of 0.997 (0.978-1.016 90% CI), a number not significantly different from 1.0 (Stehn et al. 2006).

### *Recovery Criteria*

The Spectacled Eider Recovery Plan (USFWS 1996) presents research and management priorities with the objective of recovery and delisting so that protection under the ESA is no longer required. Although cause of the spectacled eider population decline is not known, factors that affect adult survival may be the most influential on population growth rate. Under the Recovery Plan, the species will be considered recovered when each of the three recognized populations (Y-K Delta, North Slope of Alaska, and Arctic Russia): 1) is stable or increasing over 10 or more years and the minimum estimated population size is at least 6,000 breeding pairs, or 2) number at least 10,000 breeding pairs over 3 or more years, or 3) number at least 25,000 breeding pairs in one year. Spectacled eiders do not currently meet these recovery criteria.

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<sup>4</sup> A standard index used to monitor waterfowl populations based on the number of birds seen during aerial surveys but adjusted for cryptic females that are presumably missed when single males are detected (USFWS and Canadian Wildlife Service 1987).

<sup>5</sup> The detection correction factor compares the number of eiders observed during aerial surveys with the number of nests located on ground surveys in order to presume actual population size from the number detected in aerial surveys.

### *Critical Habitat*

Critical habitat units have been designated to protect molting areas and the only known wintering area. One of these units, the Ledyard Bay unit, is within the Action Area and is discussed below.

## **3.2 Steller's Eider**

### *Physical Appearance*

The Steller's eider is the smallest of the four eider species. From early winter until mid-summer males are in breeding plumage - black back, white shoulders and sides, chestnut breast, white head with black eye patches and a greenish tuft (Figure 3.5). During late summer and fall, males molt to dark brown with a white-bordered blue wing speculum; this plumage is replaced during the autumn molt when males re-acquire breeding plumage, which lasts through the next summer. Females are dark mottled brown with a blue wing speculum year round. Juveniles are dark mottled brown until the fall of their second year, when they acquire breeding plumage (Fredrickson 2001).



**Figure 3.5 - Male and female Steller's eider in breeding plumage.**

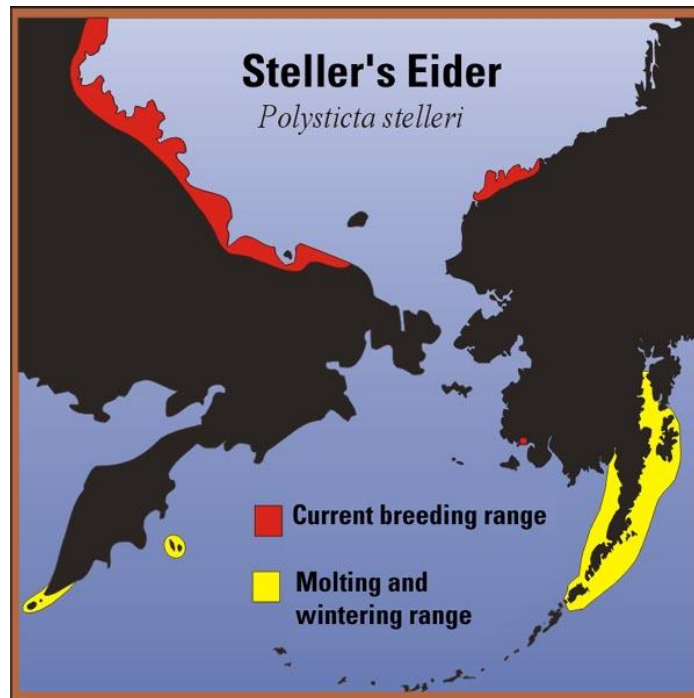
### *Status and Distribution*

The Steller's eider is a circumpolar sea duck. Steller's eiders are divided into Atlantic and Pacific populations; the Pacific population is further divided into the Russia-breeding population along the Russian eastern arctic coastal plain, and the Alaska-breeding population.

On June 11, 1997, the Alaska-breeding population of Steller's eiders was listed as threatened based on a substantial decrease in this population's breeding range and the increased vulnerability of the remaining Alaska-breeding population to extirpation (Federal Register 62(112):31748-31757). Although population size estimates for the Alaska-breeding population were imprecise, it was clear Steller's eiders had essentially disappeared as a breeding species from the Y-K Delta, where they had historically occurred in significant numbers, and that their Arctic Coastal Plain (North Slope) breeding range was much reduced. On the North Slope they historically occurred east to the Canada border (Brooks 1915), but have not been observed on the eastern North Slope in recent decades (USFWS 2002b). The Alaska-breeding population of Steller's eiders now nests primarily on the North Slope, particularly around Barrow and at very



low densities from Wainwright to at least as far east as Prudhoe Bay (Figure 3.6). A few pairs may remain on the Y-K Delta; 9 nests have been found in the last 14 years (Service, unpublished data).



**Figure 3.6 - Steller's eider distribution in the Bering, Beaufort and Chukchi seas (USFWS 2002b).**

#### *Life History – North Slope (Breeding)*

Steller's eiders arrive in pairs on Alaska's North Slope in early June, but are intermittent breeders; since 1991, Steller's eiders near Barrow apparently nested in 10 years but did not nest in 7 years (Rojek 2008). Individuals foregoing breeding is common in long-lived eider species and is typically related to inadequate body condition (Coulson 1984), but reasons for Steller's eiders non-breeding may be more complex. In the Barrow area, Steller's eider nesting is correlated with lemming numbers and other environmental cues; nest success could be enhanced in years of lemming abundance because nest predators are less likely to prey-switch to eider eggs and young, or because avian predators such as pomarine jaegers (*Stercorarius pomarinus*) and snowy owls (*Nyctea scandiaca*) that nest nearby (and consume abundant lemmings) may protect eider nests from mammalian predators such as arctic fox (Quakenbush and Suydam 1999, and summarized by Rojek 2006).

When they do breed, Alaska-breeding Steller's eiders nest on coastal tundra adjacent to small ponds or within drained lake basins, occasionally as far as 90 km inland. Nests are initiated in the first half of June (Quakenbush et al. 1995), and hatching occurs from July 7 to August 3 (Quakenbush et al. 1998). Nests located in the vicinity of Barrow were in wet tundra, in drained

lake basins or low-center or low indistinct flat-centered polygon areas (Quakenbush et al. 1998). Average clutch sizes at Barrow varied from 5.3-6.3, with clutches of up to 8 reported (Quakenbush et al. 1998, Rojek 2005). Nest success (proportion of nests with at least one egg hatched) at Barrow averaged 17% from 1991-2002 (Service, unpublished data). As with spectacled eiders, nest and egg loss was attributed to predation by jaegers, common raven (*Corvus corax*), arctic fox, and possibly glaucous gulls (*Larus hyperboreus*) (Quakenbush et al. 1995, Obritschkewitsch et al. 2001).

Within a day or two after hatch, hens move their broods to adjacent ponds with emergent vegetation, particularly *Carex* spp. and *Arctophila fulva* (Quakenbush et al. 1998, Rojek 2006, 2007). Here they feed on insect larvae and other wetland invertebrates. Broods may move up to several kilometers from the nest prior to fledging (Quakenbush et al. 1998, Rojek 2006). Fledging occurs from 32-37 days post hatch (Obritschkewitsch et al. 2001, Rojek 2006).

#### *Life History – North Slope (Non-breeding)*

Departure from the breeding grounds differs between sexes and between breeding and non-breeding years. Male Steller's eiders typically leave the breeding grounds after females begin incubating, around the end of June or early July (Quakenbush et al. 1995, and Obritschkewitsch et al. 2001). Females whose nests fail may remain near Barrow later in summer; a single failed-breeding female equipped with a transmitter in 2000 remained near the breeding site until the end of July and stayed in the Beaufort Sea off Barrow until late August (Martin et al. *in prep*). Successfully-breeding females and fledged young depart the breeding grounds in early to mid-September. In a non-breeding year, satellite-transmitted males and females dispersed across the area between Wainwright and Admiralty Inlet in late June and early July, with most birds entering marine waters by the first week of July. They were tracked at coastal locations from Barrow to Cape Lisburne, and made extensive use of lagoons and bays on the north coast of Chukotka (Martin et al. *in prep*).

After the breeding season, Steller's eiders move to marine waters where they undergo a complete flightless molt for about 3 weeks. The combined (Russia- and Alaska-breeding) Pacific population molts in numerous locations in southwest Alaska, with exceptional concentrations in four areas along the north side of the Alaska Peninsula: Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands (Gill et al. 1981, Petersen 1981, Metzner 1993). After molt, many of the Pacific-wintering population of Steller's eiders disperse to winter in the eastern Aleutian Islands, the south side of the Alaskan Peninsula, and as far east as Cook Inlet, although thousands may remain in lagoons used for molt unless or until freezing conditions force them to move (USFWS 2002b).

Prior to spring migration, thousands of Steller's eiders stage in estuaries along the north side of the Alaska Peninsula, including some molting lagoons, and at the Kuskokwim Shoals near the mouth of the Kuskokwim River in late May (Larned 2007, Martin et al. *in prep*). Like other eiders, Steller's eider may use spring leads for feeding and resting, but there is little information on habitat use during spring migration. It seems likely Steller's eiders are also using the Chukchi lead system similarly to king eiders (Steffen Oppel, University of Alaska-Fairbanks, unpublished data).

### *Alaska-breeding Steller's Eider Abundance and Trends*

Stehn and Platte (2009) conducted a review of the distribution, abundance, and trend of the listed population of Steller's eiders on the ACP. Utilizing information from three aerial surveys, (the ACP, the North Slope eider survey (NSE) and the Barrow Triangle survey (ABR)), they assessed the population status and trend of the Steller's eider population nesting on tundra wetlands of northern Alaska. Data reported from these three surveys provide different estimates of average population size and trend. The 1989-2008 ACP survey (Mallek et al. 2007) estimated a total average population size of 866 birds with a declining growth rate of 0.778; the NSE are from 1992-2008 (Larned et al. 2009) averaged 162 birds with increasing growth rate of 1.059. The ABR survey from 1999-2007 (Obrishkewitsch et al. 2008) averaged 100 birds with a growth rate of 0.934. Average population size and trend can be biased by changes in observer, detection rates and survey timing. Survey timing was considered especially important for species with male departure early in incubation, or other marked shifts in habitat use, movements, or flocking behavior (ground breeding surveys near Barrow indicate the best time for aerial surveys of breeding Steller's is about 12-20 June, after arrival of most breeding individuals but before most males depart. Using a subset of data least confounded by changes in survey timing and observer, the appropriately-timed NSE survey observations from 1993-2008 averaged 173 indicated total Steller's eiders (88-258, 90% confidence interval) with an estimated growth rate of 1.011 (0.857 – 1.193, 90% CI). The authors assumed a detection probability of 30% (based upon reasonable estimates with similar species and habitats), yielding a total average population of Steller's eiders breeding in the ACP of about 576 (292-859, 90% CI) individuals (Stehn and Platte 2009).

### *Recovery Criteria*

The Steller's Eider Recovery Plan (USFWS 2002b) presents research and management priorities, that are re-evaluated and adjusted every year, with the objective of recovery and delisting so that protection under the ESA is no longer required. When the Alaska-breeding population was listed as threatened, factors causing the decline were unknown, but possible causes identified were increased predation, over hunting, ingestion of spent lead shot in wetlands, and habitat loss from development. Since listing, other potential threats have been identified, including exposure to other contaminants, scientific research, and climate change but causes of decline and obstacles to recovery remain poorly understood.

Criteria to be used in determining when species are recovered are often based on historical abundance and distribution, or on the number needed to ensure the risk of extinction is tolerably low (with extinction risk estimated by population modeling). For Steller's eiders, information on historical abundance is lacking, and life history parameters needed for accurate population modeling are inadequately understood. Therefore, the Recovery Plan for Steller's eiders establishes interim recovery criteria based on extinction risk, with the assumption that numeric population goals will be developed as life history parameters become better understood. Under the Recovery Plan, the Alaska-breeding population would be considered for reclassification to endangered if the population has  $\geq 20\%$  probability of extinction in the next 100 years for 3 consecutive years, or the population has  $\geq 20\%$  probability of extinction in the next 100 years and is decreasing in abundance. The Alaska-breeding population would be considered for delisting from threatened status if it has  $\leq 1\%$  probability of extinction in the next 100 years, and

each of the northern and western subpopulations are stable or increasing and have  $\leq 10\%$  probability of extinction in 100 years.

#### *Steller's Eider Critical Habitat*

In 2001, the Service designated 2,830 mi<sup>2</sup> (7,330 km<sup>2</sup>) of critical habitat for the Alaska-breeding population of Steller's eiders at breeding areas on the Y-K Delta, a molting and spring-staging area in the Kuskokwim Shoals, and molting areas in marine waters at the Seal Islands, Nelson Lagoon, and Izembek Lagoon (Federal Register 66:8849-8884). None of these critical habitat units are within the Action Area so they are not discussed further.

### **3.3 Yellow-billed Loon**

#### *Physical Appearance*

The yellow-billed loon (*Gavia adamsii*) is the largest, rarest, and most northerly distributed of the five loon species in the family Gaviidae. Although the yellow-billed loon is similar in appearance to the common loon (*Gavia immer*), the yellow-billed loon is most easily distinguished by their larger yellow or ivory-colored bill. During the non-breeding season, yellow-billed loons lose their distinctive black and white plumage and molt into dull, light brown feathers. Yellow-billed loons are specialized for aquatic foraging with a streamlined shape and legs near the rear of the body, and are unable to take flight from land.

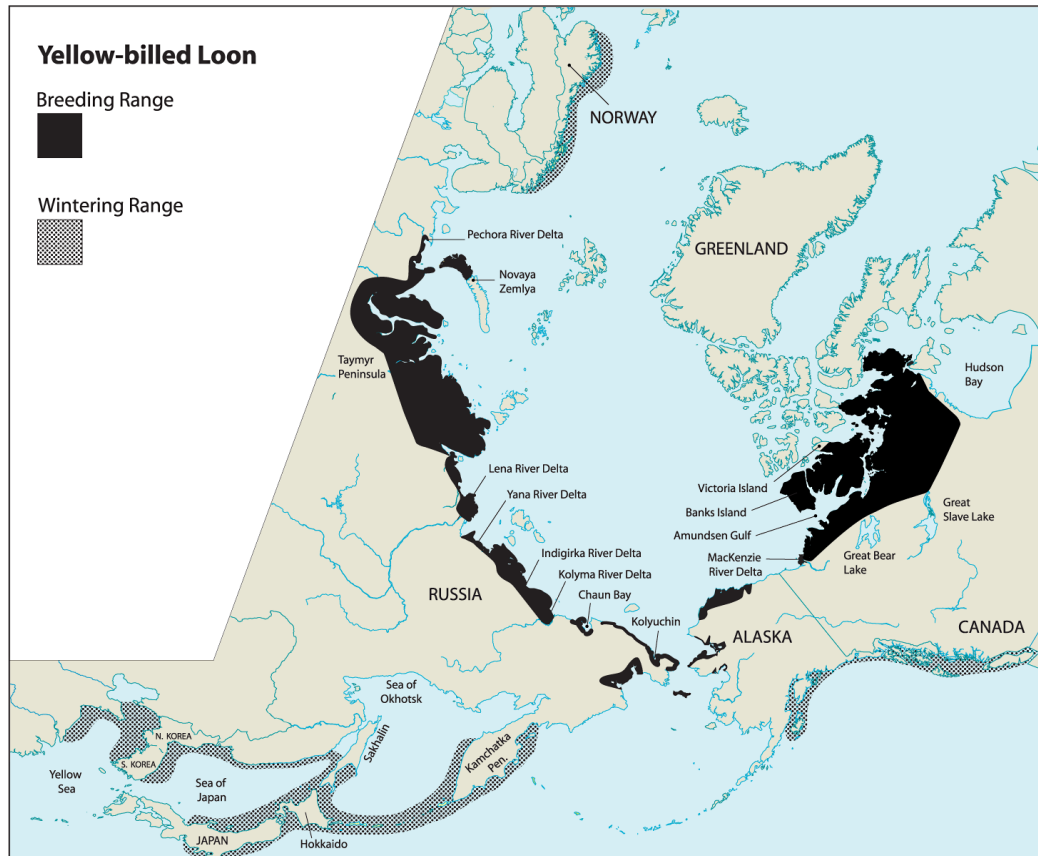
#### *Status and Distribution*

On March 25, 2009, the yellow-billed loon was designated a candidate for protection under the ESA because of its small population size range-wide and concerns about levels of subsistence harvest and other potential impacts to the species (Federal Register 74(56):12932-12968). The Service places a species on the candidate list when there is sufficient information on biological vulnerability and threats to warrant proposing to list the species as endangered or threatened. Candidate status signals conservation concern for a species, and the Service encourages agencies, organizations and individuals to participate in research and conservation activities that may preclude the need to list under the ESA. The Service will prepare a proposal to list a candidate species when funding becomes available.

Yellow-billed loons are vulnerable due to a combination of small population size, low reproductive rate, and very specific breeding habitat requirements. It is thought that loons occupy the same breeding territory throughout their reproductive lives. There is no reliable scientific information on lifespan and survivorship, but as large-bodied birds with low clutch size, yellow-billed loons are probably what is known as "K-selected;" that is, they are long-lived and dependent upon high annual adult survival to maintain populations.

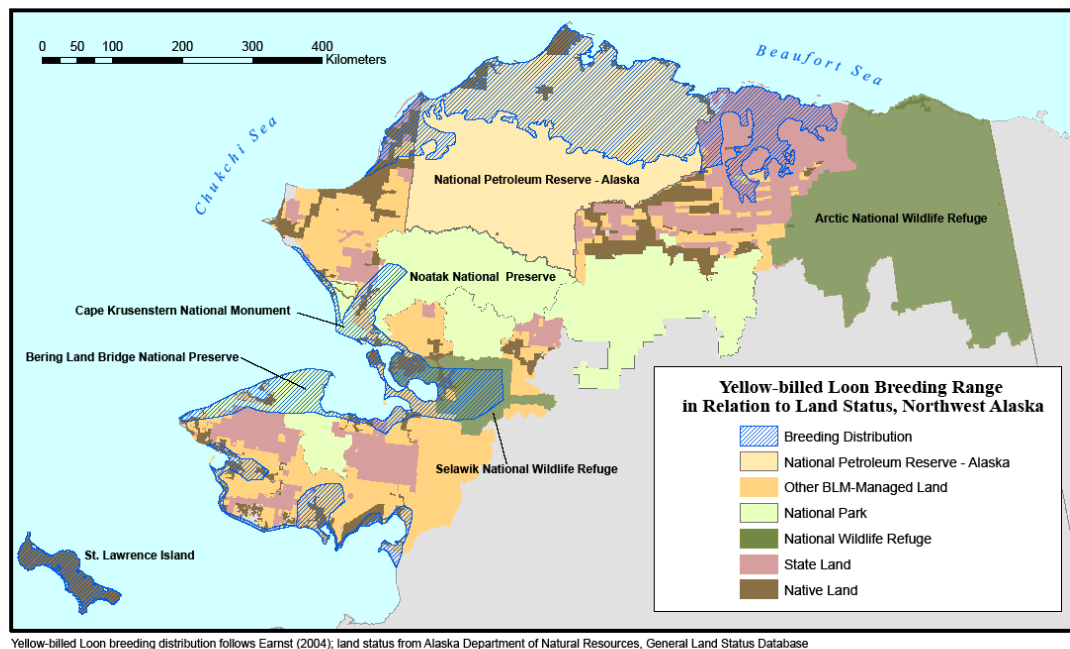
Yellow-billed loons nest exclusively on margins of lakes and islands in coastal and inland low-lying tundra from latitude 62° to 74° North. Yellow-billed loons nest from June to September near freshwater lakes in tundra on Alaska's Arctic Coastal Plain (ACP), northwestern Alaska, and St. Lawrence Island; in Canada east of the Mackenzie Delta and west of Hudson Bay; and in Russia on a relatively narrow strip of coastal tundra from the Chukotka Peninsula in the east and on the western Taymyr Peninsula in the west, with a break in distribution between these two

areas (Earnst 2004, North 1993, Red Data Book of the Russian Federation 2001, Ryabitsev 2001, Il'ichev and Flint 1982, Pearce et al. 1998) (Figure 3.7). Yellow-billed loons are sparsely distributed, and are somewhat clumped at a large scale, perhaps because of non-uniform quality of habitat.



**Figure 3.7 - Worldwide range of the yellow-billed loon.**

Within Alaska, there are two breeding areas – the Arctic coastal plain region north of the Brooks Range and the region surrounding Kotzebue Sound in northwest Alaska, primarily the northern Seward Peninsula (Earnst 2004, North 1993) (Figure 3.8).



**Figure 3.8 -Yellow-billed loon breeding distribution in Alaska.**

#### *Life History - Breeding*

Lakes that are able to support breeding loons have abundant fish populations; are > 2 m deep which allows unfrozen water under the ice during winter; are large (at least 13.4 hectares or 33 acres); are often connected to streams that may supply fish; feature highly convoluted, vegetated, and low-lying shorelines; and provide clear water and dependable water levels (Earnst et al. 2006, Stehn et al. 2005, North 1994).

Nest sites are usually located on islands, hummocks, or peninsulas, along low shorelines, within 1 m of water. Nests are constructed of mud or peat, and are often lined with vegetation. One or two large eggs are laid in mid- to late June (North 1994). Egg replacement after nest predation occurs rarely as the short arctic summer probably precludes the production or success of replacement clutches (Earnst 2004). Hatching occurs after 27 to 28 days of incubation by both sexes. Although the age at which young are capable of flight is unknown, it is probably similar to common loons (8-9, possibly up to 11, weeks). Young leave the nest soon after hatching, and the family may move between natal and brood-rearing lakes. Both males and females participate in feeding and caring for young (North 1994).

Information on reproductive success is limited but significant inter-annual variation has been described. Mayfield survival rates to 6 weeks of ages for yellow-billed loons on the Colville River Delta between 1995-2000 ranged from 4% to 60% (Earnst 2004), with low success attributed to late ice melt or extreme flooding. Apparent nest success on the Colville River Delta

recorded by aerial surveys ranged from 19% - 64% between 1993 and 2007 (ABR, Inc. 2007, ABR, Inc., unpublished data).

During the breeding season, foraging habitats include lakes, rivers, and the nearshore marine environment. Successfully breeding adults feed their young almost entirely from the brood-rearing lake (North 1994). Ninespine sticklebacks (*Pungitius pungitius*) and least cisco (*Coregonus sardinella*) are thought to be the main foods of chicks in Alaska (Earnst 2004). Other freshwater prey available in Alaska that are likely utilized include Alaska blackfish (*Dallia pectoralis*), fourhorn sculpins (*M. quadricornus*), amphipods, and isopods (Earnst 2004), as well as aquatic plant material (Sjölander and Ågren 1976).

#### *Life History – Migration and Wintering*

The yellow-billed loon is a migratory species. During the non-nesting season (October through May), the species winters in principally coastal marine waters at mid to high latitudes, including southern Alaska and British Columbia to Puget Sound; the Pacific coast of Asia from the Sea of Okhotsk south to the Yellow Sea; the Barents Sea and the coast of the Kola Peninsula; coastal waters of Norway; and possibly Great Britain (Earnst 2004, North 1993, Ryabitshev 2001, Schmutz *pers. comm.* 2008, Strann and Østnes 2007, Burn and Mather 1974, Gibson and Byrd 2007) (Figure 3.7). A small proportion of yellow-billed loons may winter in interior lakes or reservoirs in North America (North 1994). Non-breeding birds remain in marine waters throughout the year, either in wintering areas or offshore from breeding grounds.

Yellow-billed loon migration routes are thought to be primarily marine. Schmutz (2008 *pers. comm.*) found that adult yellow-billed loons marked with satellite transmitters on the breeding grounds in Alaska generally remained between 1 and 20 miles from land during migration and winter. Yellow-billed loons migrate singly or in pairs, but gather in polynyas (areas of open water at predictable, recurrent locations in sea-ice covered regions), ice leads (more ephemeral breaks in sea ice, often along coastlines), and early-melting areas off large river deltas near breeding grounds in spring along the Beaufort Sea coast of Alaska and Canada (Barry et al. 1981, Barry and Barry 1982, Woodby and Divoky 1982, Johnson and Herter, 1989, Barr 1997, Alexander et al. 1997, Mallory and Fontaine 2004).

Yellow-billed loons breeding in Alaska have been studied to determine migration routes. Nineteen yellow-billed loons captured on the ACP between 2002 and 2008 were outfitted with satellite transmitters (Schmutz 2008 *pers. comm.*). All of them migrated to Asia, predominantly south along the Russian coastline from the Chukotka Peninsula (either through the Bering Strait or across the mountains from the north side of the Chukotka Peninsula to the Gulf of Anadyr), and along the Kamchatka coast. They wintered in the Yellow Sea and Sea of Japan off China, North Korea, Russia, and Japan (near Hokkaido). All 10 yellow-billed loons fitted with transmitters on the Seward Peninsula, Alaska, in 2007 and 2008 also used the Bering Strait region after leaving breeding grounds. Five of these migrated to Asian grounds as described above for ACP breeding birds; the other 5 wintered throughout the Aleutian Islands from Shemya Island in the west to the Semidi Islands off the coast of the Alaska Peninsula (Schmutz 2008 *pers. comm.*). Most of these yellow-billed loons departed breeding areas in late September, arrived in wintering locations in mid-November, started spring migration in April, and arrived on

breeding grounds in the first half of June; these dates are consistent with breeding ground arrival dates reported by North (1994). Non-breeders or failed nesters may start fall migration in July.

The migration routes of yellow-billed loons breeding in Russia have not been studied. Because of the proximity of the Chukotka Peninsula to the ACP in Alaska, and the fact that ACP breeding yellow-billed loons use the Chukotka Peninsula during migration (Schmutz 2008 *pers. comm.*), it is likely that some or all yellow-billed loons from eastern Russia migrate through the Chukchi Sea and Bering Straits to Asian wintering areas.

Although yellow-billed loons are known to forage underwater for fish and aquatic invertebrates, limited information exists on specific prey species consumed by the loons in the marine environment. Marine prey species collected from loons wintering in southeast Alaska and Canada include fish such as sculpins (*Leptocottus armatus*, *Myoxocephalus* sp.), Pacific tomcod (*Microgadus proximus*), and rock cod (*Sebastes* sp.), and invertebrates such as amphipods (*Orchomonella* sp., *Anonyx nirgax*), isopods (*Idothea* sp.), shrimps (*Pandalus danae*, *Spirontocaris ochotensis*), hermit crabs (*Pagurus* sp.), and marine worms (*Nereis* sp.) (Bailey 1922, Cottam and Knappen 1939, North 1994, Earnst 2004). Prey species taken in other wintering grounds, such as in the Yellow Sea (which supports 276 fish species and 54 crustacean species; UNDP 2002) are unknown.

#### *Yellow-billed Loon Abundance and Trends*

The global breeding ground population size for yellow-billed loons is unknown, but probably in the range of 16,000-32,000, with an Alaska population of 3,000-4,000 (Federal Register 74(56):12932-12968). Maximum estimates based on the amount of available habitat (plus limited survey data for Canada) are 20,000 birds in Canada and 8,000 in Russia. Most of the breeding range of the yellow-billed loon has not been adequately surveyed, and only in Alaska have surveys been conducted specifically for breeding yellow-billed loons.

In Alaska, yellow-billed loon population indices on the ACP are determined by two independent fixed-wing aerial transect surveys for waterfowl conducted each year by the Service's Migratory Bird Management program. The North Slope Eider survey is flown in early June (1992-2008) and the Arctic Coastal Plain survey in late June (1986-2006). Survey timing and coverage differs between the two surveys, and the long-term mean yellow-billed loon population index differs. Overall, an estimated 2,500-3,500 yellow-billed loons breed on the ACP (USFWS unpublished data based on examining results in Earnst et al. 2005, Stehn et al. 2005, Mallek et al. 2007, Larned et al. 2009). Approximately 500 loons breed in the Kotzebue Sound region in western Alaska. Population indices in western Alaska are determined from fixed-wing aerial lake-circling surveys flown on the Seward Peninsula and Cape Krusenstern (June 2005 and 2007) and Selawik National Wildlife Refuge (June 1996 and 1997) (Platte 1999, Bollinger et al. 2008).

The Service recently examined a subset of the NSE data through 2008 that analyzed the pilot-observer data. The average growth rate using this subset of data is estimated at 0.986 (0.967-1.006, 95% C.I.) (USFWS unpublished data). This suggests the ACP breeding population is relatively stable or slightly declining. Limited surveys have been conducted only in small parts



of the Russian and Canadian ranges, so population sizes for these ranges are gross approximations and no information on trends is available.

### **3.4 Kittlitz's Murrelet**

#### *Physical Appearance*

Kittlitz's murrelets are small diving seabirds in the family Alcidae (including puffins, guillemots, and murre) which inhabit Alaskan coastal waters. Breeding plumage is mottled golden-brown and winter non-breeding plumage is more distinct, with a white underbelly and face and dark back and chest band.

#### *Status and Distribution*

On May 4, 2004, the Kittlitz's murrelet was designated a candidate for protection under the ESA because its numbers have declined sharply and it may warrant listing as threatened or endangered (Federal Register 69(86):24875-24904).

All of the North American and a large proportion of the known world population of Kittlitz's murrelets breed, molt, and winter in Alaska (Day et al. 1999). An estimated 10% of the world population breeds in the Russian Far East from the Okhotsk Sea to the Chukchi Sea (Day et al. 1999), but in the late 1990's large numbers of Kittlitz's murrelets were reported from the Kamchatka Peninsula (Vyatkin 1999). During the breeding season, Kittlitz's murrelets are often found in association with marine tidewater glaciers and glacial-influenced water and in protected fiords (Kuletz and Piatt 1992, Day and Nigro 1998, Day et al. 2000). Kittlitz's murrelets are also found around Kodiak Island, the Aleutian Islands, Bristol Bay, Seward Peninsula, Cape Lisburne, and Chukotka and Kamchatka peninsulas in Russia; areas not currently influenced by glaciers (Figure 3.9). Kittlitz's murrelets possibly nest as far north as Cape Sabine and Cape Beaufort, (inland of Ledyard Bay), although suitable habitat may not be available in that location (D.G. Roseneau, pers. comm., reported by Day et al. 1999). Suitable nesting habitat disappears north of Cape Beaufort, so the species rarely occurs and probably does not breed north of there (from Wainwright to Barrow; Huey 1931, Bailey et al. 1933, Bailey 1948, Pitelka 1974).



**Figure 3.9 - Breeding distribution of Kittlitz's murrelet in North America (Day et al. 1999).**

#### *Life History*

Kittlitz's murrelets appear to use a predator avoidance strategy for nesting; their nests are widely dispersed in areas with sparse or no vegetation (Kaler et al. 2008). They nest solitarily on the ground, in very remote areas (Day 1995; Day et al. 1999). Nesting habitat in Alaska is believed to be unvegetated scree-fields, coastal cliffs, barren ground, rock ledges, and talus above timberline in coastal mountains, generally in the vicinity of glaciers, cirques near glaciers, or recently glaciated areas, primarily from the Alaska Peninsula to Glacier Bay (Day et al. 1983; Day 1995; Day et al. 1999; Piatt et al. 1999). Local climate, geomorphology and elevation may be important parameters determining nest site suitability (Kaler 2006). Kittlitz's murrelets lay one large egg in a stone nest bowl, and the same site may be used for nesting year after year (Piatt et al. 1999). The timing of egg-laying appears to be asynchronous (Kissling, US Fish and Wildlife Service, Juneau, Alaska, unpublished data, 2007). Egg laying initiates approximately 18 May through 29 June (Agness 2006; Kissling et al. 2007a; Kaler et al. In Press) (June in northern Alaska; Day et al. 1999), and there is evidence that Kittlitz's murrelets attempt to renest (Kaler et al. 2008). Duration of incubation is 30 days (Kissling, US Fish and Wildlife Service, Juneau, Alaska, unpublished data, 2007; Kaler et al. in press). The chick is fed for 24 to 30 days post-hatch (Day et al. 1999; Nalsund et al. 1994; Kaler et al. In Press). Young fledge in August in the northern part of their range, including the Chukchi Sea coast (Day et al. 1999). Both males and females incubate eggs and brood the young. There is no information on annual or lifetime reproductive success but some evidence suggests this species may forego breeding in some years (Day et al. 1999).

Kittlitz's murrelets occur at sea in substantial numbers along the ice edge in late summer and fall, particularly in the central Chukchi Sea, although there is much interannual variation in abundance (fall population in Chukchi Sea estimated as 1,000-5,000 birds by G.J. Divoky,

University of Alaska-Fairbanks, unpubl. data). The species is not recorded in the Beaufort Sea (Divoky 1984, Johnson and Herter 1989). Both the timing and migration routes to and from the breeding grounds are unknown, but the shift between summer and winter distribution appears to be rapid and asynchronous (Day et al. 1999). It is likely that Kittlitz's murrelets follow the retreating ice edge, feeding on the biomass associated with ice plankton blooms.

During the breeding season, Kittlitz's murrelets feed on schooling fishes such as Pacific capelin, Pacific sand lance, Pacific herring (*Clupea pallasii*), and walleye pollock (Piatt et al. 1994; Day and Nigro 2000; Agness 2006; Kissling et al. 2007a). Although they are considered a piscivorous species, Kittlitz's murrelets also feed on invertebrates (Sanger 1987; Hobson et al. 1994). Because the energy density of available forage fishes is seasonally influenced (Montevecchi and Piatt 1987; Litzow et al. 2004), Kittlitz's murrelets may switch prey at various times of the year (Ostrand et al. 2004). In Prince William Sound and Glacier Bay, they tend to forage as single birds or in small groups (Day and Nigro 2000; Agness 2006), and rarely forage in mixed-species feeding flocks (Day and Nigro 2000). Winter foods are unknown, although the stomach of one museum specimen contained macro-zooplankton (Day et al. 1999).

The winter range of the Kittlitz's murrelet is not well known, but is probably pelagic (open ocean) (Day et al. 1999). There are records of occasional winter sightings in Southeast and western Alaska, and locally common sightings in a few locations in Southcoastal Alaska (Kendall and Agler 1998; Day et al. 1999). Kittlitz's murrelets are also reported during winter in the mid-shelf regions of the northern Gulf of Alaska (Day and Prichard 2001). Winter range of the species outside the Americas is largely unknown, but observations have been reported from the Kamchatka Peninsula and the Kuril Islands in the Russian Far East (Flint et al. 1984).

#### *Abundance and Trends*

The Kittlitz's murrelet is thought to be one of the rarest seabirds in North America. Based on compilation of information from various locations and from various years from 1999 to 2008, the Service's current Alaska population estimate of the Kittlitz's murrelet is 19,578 birds (range = 8,190-36,193; USFWS 2009b). Additionally, there may be as many as 5,000 birds along the north-eastern coast of Kamchatka (Vyatkin 1999) and perhaps 100 birds on the southeastern tip of the Chukotka Peninsula (Konyukhov et al. 1998); however, data from Russia are scarce. Given these data together, the worldwide population of Kittlitz's murrelets is estimated to be 24,678 individuals (USFWS 2009b).

Based on a long-term data set from Prince William Sound, Kittlitz's murrelets in Alaska have declined at a rate of up to 18% per year from 1989 to 2000 (Kuletz et al. 2003; USFWS 2004b). These data from Prince William Sound in Southcentral Alaska indicate that the Kittlitz's murrelet population has declined 84% over the 11 survey years. Other documented declines of Kittlitz's murrelets in Southcentral Alaska include an estimated 74% decline along the coast of the Kenai Fjords (1986-2002; van Pelt and Piatt 2003) and 43% decline between two decadal periods (1988-1999 and 2004-2007) in Kachemak Bay, Lower Cook Inlet (Kuletz et al. 2008). In Southeast Alaska, documented declines include an estimated 80% decline in Glacier Bay (between 1991 and 1999-2000; Robards et al. 2003, Drew and Piatt 2008), 90% decline in Malaspina Forelands (Kissling et al. 2007b), and possibly 59% over a 3-year period in Icy Bay

(2002-2005; Kissling, USFWS, unpublished data, 2006). Data from two surveys around Adak Island in the Aleutians suggest an annual decline of 7.4% for marbled and Kittlitz's murrelets combined (Piatt et al. 2007). There are no data available to assess declining population trends in the Russian population.

The International Union for Conservation of Nature and Natural Resources (IUCN) considers Kittlitz's murrelets critically endangered. NatureServe categorizes Kittlitz's murrelets as Globally Imperiled (G2; NatureServe 2005).

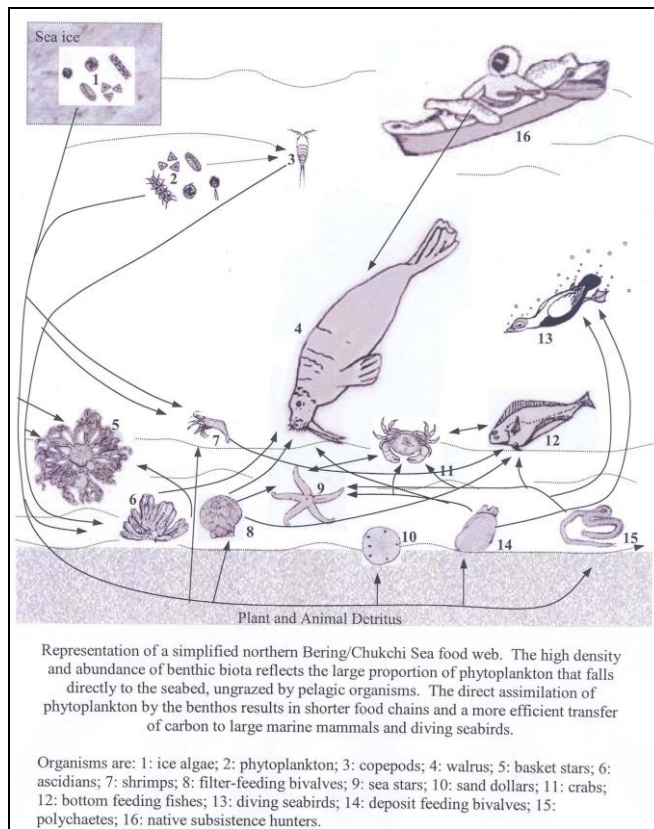
### **3.5 Ledyard Bay Critical Habitat Unit**

The LBCHU was designated on February 6, 2001 (Federal Register 66(25): 9146-9185). In accordance with section 3(5)(A)(i) of the ESA and regulations in 50 C.F.R. 424.12, critical habitat for a species contains those physical or biological features that are essential for the conservation of the species and which may require special management considerations and protection. Under the ESA these features are considered "primary constituent elements" of critical habitat, and include, but are not limited to: space for individual and population growth, and for normal behavior; food, water air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and habitats that are protected from disturbance or are representative of the historical geographic and ecological distribution of a species.

The LBCHU was designated because of its importance to migrating and molting spectacled eiders. It includes waters of Ledyard Bay within about 1.85-74 km (1-40 nautical miles [nm]) from shore. Individuals from all three breeding populations of spectacled eiders molt in Ledyard Bay, including most (77%) females that nest on the North Slope (Petersen et al. 1999). Primary constituent elements identified for LBCHU are marine waters > 5 m and ≤ 25 m deep, along with associated marine aquatic flora and fauna in the water column, and the underlying marine benthic community. Conserving the ecosystem processes and physical and biological features of Ledyard Bay may be essential for the conservation of spectacled eiders.

Grebmeier and Dunton (2000) summarized the current understanding of processes in the northern Bering and Chukchi seas that contribute to the relatively abundant benthic community found in Arctic sea shelves like Ledyard Bay. The seasonally ice-covered Bering and Chukchi sea shelves are some of the largest in the world, and they support an extremely productive and dynamic benthic system containing some of the highest faunal biomass in the Arctic Ocean. An inflow of nutrient-rich Pacific waters across the shallow shelves supports high primary production, with high edge-ice productivity in regions of limited open water. In general, the high primary production is not directly consumed by pelagic secondary consumers so it settles quickly to the underlying benthos, generating a particularly rich macrobenthic community (Grebmeier 1993, Highsmith and Coyle 1992, Grebmeier and Cooper 1995). As a result, large populations of benthic-feeding marine mammals and birds are apex predators in relatively short food chains and simple food webs in Arctic sea-shelf ecosystems (Grebmeier and Harrison 1992, Highsmith and Coyle 1992, Hunt 1991, Oliver and Slattery 1985, Oliver et al. 1983). Grebmeier and Dunton (2000) described a representative Chukchi Sea food web in which the spectacled eider is

a direct predator on a deposit-feeding benthic mollusk (Figure 3.10); this likely characterizes the ecosystem of Ledyard Bay.



**Figure 3.10 - Representative Chukchi Sea food web with spectacled eider in apex predator functional role (from Grebmeier and Dunton 2000).**

Some specific information exists about the benthic community within Ledyard Bay, as Feder et al. (1989, 1994a and 1994b) sampled sediment and benthic invertebrates at 37 sites in the eastern Chukchi Sea, including six sites within the LBCHU. In the LBCHU, seafloor depth varied from 18-32 m. Five LBCHU sample sites were from two statistically distinct groups: a sand/gravel-bottom assemblage with an infauna (organisms that dwell in the sediment) dominated by a nuculoida clam (*Yoldia scissurata*), and epibenthos (organisms that are on or attached to the bottom substrate) dominated by scallops (*Chlamys behringiana*), gastropods (*Neptunea* spp.), and acorn barnacles (*Balanus crenatus*); and a sand-bottom assemblage with an infauna dominated by mussels (*Musculus* spp.) and epibenthos dominated by sand dollars (*Echinarachnius parma*). The sixth site, near the western edge of the LBCHU boundary, was an offshore muddy-gravel assemblage. Feder et al. (1994a and 1994b) noted the relatively high standing stocks of benthos in this area was possible because local carbon was augmented by particulate organic carbon advected by ocean currents from highly productive areas in the Pacific. Feder et al. (1994b) further determined the distribution of infaunal and epifaunal mollusks was related to the environmental variables of bottom substrate and water masses in the northeastern Chukchi Sea. They concluded that abundance and biomass of infaunal mollusks

increased from the Bering Shelf towards the coast. Indeed, some of the Ledyard Bay sites had the highest invertebrate abundance and biomass in the study.

This rich Ledyard Bay benthic community likely provides an important and predictable food resource for spectacled eiders during two energetically demanding portions of their life history: 1) during northward migration immediately prior to egg-laying when females must maintain or increase their body weight; and 2) the post-breeding molt. Although food habits studies have not been conducted for listed eiders in Ledyard Bay, the LBCHU benthic community is likely similar to (or exceeds) the food value of the Bering Sea wintering area benthos.

In summary, a particular set of environmental conditions coincide in the vicinity of Ledyard Bay to create a predictable and abundant food supply for bottom-feeding diving predators like eiders: a shallow ocean shelf with near-shore sandy or gravelly substrates overlain by rich ocean currents; enhanced ice-edge productivity during the brief open water season; short but productive food chains and food webs; high benthic invertebrate biomass and abundance; near-shore spring leads that provide early season access to the food resources for migrating eiders; and open water conditions over those resources during the summer/autumn molt. The Service believes these are the features of the primary constituent elements of Ledyard Bay that provide the conservation value of the critical habitat designated for spectacled eiders.

### **3.6 Polar Bear**

#### *Physical Appearance*

Polar bears are characterized by a large stocky body, with a longer neck and proportionately smaller head than other members of the bear family, and without the distinct shoulder hump common to brown bears (*Ursus arctos*) (Figure 3.11). Polar bear fur color varies between white, yellow, gray, and brown, and is affected by oxidation or exposure to air, light conditions, and staining due to contact with fats from prey items. The nose, lips, and skin of polar bears are black (Amstrup 2003).

Polar bears exhibit sexual dimorphism with female body length, skull size, and body mass considerably less than males (Derocher et al. 2005). Adult males weigh up to 654 kg (1,440 lbs) (Kolenosky et al. 1992), with some individuals not weighed estimated at 800 kg (1,760 lbs) (DeMaster and Stirling 1981). Adult females weigh 181 to 317 kg (400-700 pounds).



**Figure 3.11 – Polar Bears**  
Photo by Steve Hillebrand, USFWS

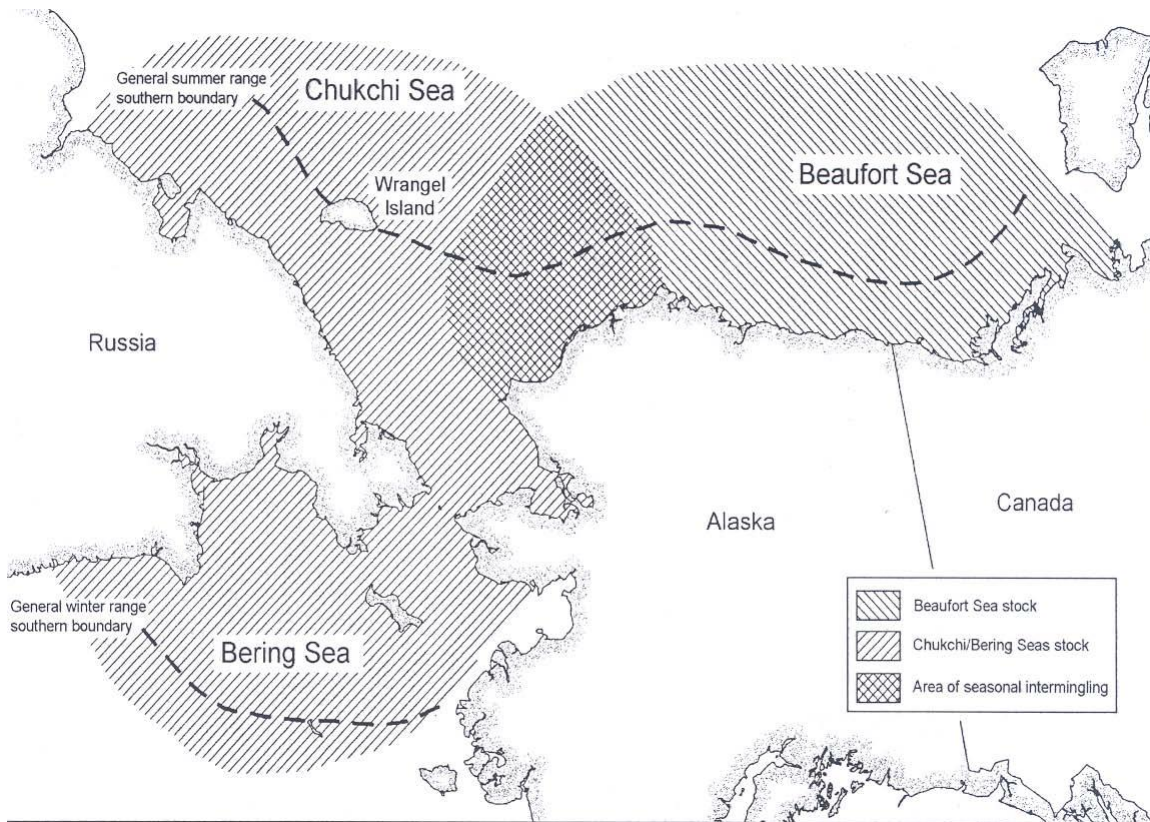
#### *Distribution and Status*

Polar bears are distributed throughout regions of arctic and subarctic waters where the sea is ice covered for large portions of the year. The total number of polar bears worldwide is estimated to be 20,000-25,000 bears (Schliebe et al. 2006). Although movements of individual polar bears overlap extensively, telemetry studies have demonstrated spatial segregation among groups or stocks of polar bear in different regions of their circumpolar range (Schweinsburg and Lee 1982, Amstrup 2000, Garner et al. 1990 and 1994, Messier et al. 1992, Amstrup and Gardner 1994, Ferguson et al. 1999, Carmack and Chapman 2003). Patterns in spatial segregation suggested by telemetry data, along with information from surveys, marking studies, and traditional knowledge, resulted in recognition of 19 partially discrete polar bear groups by the International Union for the Conservation of Nature (IUCN) Polar Bear Specialist Group (PBSG). These 19 groups have been described as management subpopulations (or stocks) in the scientific literature and regulatory actions (IUCN 2006).

Because the principal habitat of polar bears is sea ice, it is considered a marine mammal, and it is therefore included in the species protected under the Marine Mammal Protection Act of 1972 (MMPA). On May 15, 2008, the polar bear was listed as a threatened species range-wide under the ESA (73 FR 28212, May 15, 2008).

Two stocks of polar bears occur in Alaska: the Chukchi Sea (CS) and Southern Beaufort Sea (SBS) stocks. The ranges of these stocks are shown in Figure 3.12.





**Figure 3.12 – Range Map of Beaufort Sea and Chukchi Sea Polar Bear Stocks**

#### *Life History – Alaska Stocks*

Telemetry studies indicate polar bear movements are not random, nor do they passively follow ocean currents on the ice as previously thought (Mauritzen et al. 2003). Movement data come almost exclusively from adult female polar bears because male anatomy (their neck is larger than their skull) will not accommodate radio collars. The movements of seven male polar bears surgically implanted with transmitters in 1996 and 1997 were compared to movements of 104 females between 1985 and 1995 (Amstrup et al. 2001). The data indicated males and females had similar activity areas on a monthly basis, but males traveled farther each month (Amstrup et al. 2000b). Activity areas have not been determined for many populations, and available information reflects movement data collected prior to recent changes wrought by retreating ice conditions. In the Beaufort Sea, annual activity areas for individually monitored female bears averaged 149,000 km<sup>2</sup> (range 13,000 - 597,000 km<sup>2</sup>, Amstrup et al. 2000b). Total annual movements by female bears in the Beaufort Sea averaged 3,415 km and ranged up to 6,200 km, with a movement rate of > 4 km/hr sometimes sustained for long periods, and movements of > 50 km/day observed (Amstrup et al. 2000b). Mean activity area in the Chukchi Sea, characterized by highly dynamic ice conditions, was 244,463 km<sup>2</sup> (Garner et al. 1990). Average annual distance moved by CS female bears was 5,542 km.

Radio-collared females indicate some individuals occupy home ranges (or “multi-annual activity areas”) which they seldom leave (Amstrup 2003). The size of a polar bear’s home range is



determined, in part, by the annual pattern of freeze-up and break-up of sea ice, and therefore by the distance a bear must travel to access prey (Stirling 1988, Durner et al. 2004). A bear with consistent access to ice, leads, and seals may have a relatively small home range, while bears in areas such as the Barents, Greenland, Chukchi, Bering or Baffin seas may have to move many hundreds of kilometers each year to remain in contact with sea ice from which to hunt (Born et al. 1997, Mauritzen et al. 2001, Ferguson et al. 2001, Amstrup 2003, Wiig et al. 2003).

The CS 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, Garner et al. 1995). Polar Bears are seasonably abundant in the Chukchi Sea and their distribution is influenced by the movement of seasonal pack ice. Polar bears in the Chukchi and Bering seas move south with advancing ice during fall and winter, and move north in advance of receding ice in late spring and early summer (Garner et al. 1990). Polar bears are dependent upon sea ice for foraging and the most productive areas are near ice edges, leads, or polynyas where ocean depth is minimal (Durner et al. 2004). Polar bears can be present along the Alaskan shoreline as they opportunistically scavenge on marine mammal carcasses.

The SBS population occurs between Icy Cape, Alaska on the western boundary and Pearce Point, NWT (Amstrup et al. 1986, Amstrup and DeMaster 1988, Stirling et al. 1988). It is thought that nearly all bears in the central coastal region of the Beaufort Sea are from the SBS population, and that proportional representation of SBS bears decreases to both the west and east. For example, only 50% of polar bears occurring in Barrow, Alaska and Tuktoyaktuk, NWT are SBS bears, with the remainder being from the CS and Northern Beaufort Sea populations.

Polar bears derive essentially all their sustenance from marine mammal prey and have evolved a strategy that utilizes the high fat content of marine mammals (Best 1985, Amstrup et al. 2007). Over half the caloric content of a seal carcass occurs in the layer of fat between the skin and underlying muscle (Stirling and McEwan 1975) and polar bears quickly remove the fat layer from beneath the skin after they catch a seal. 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).

Over much of their range, polar bears are dependent on one species of seal, the ringed seal (*Phoca hispida*) (Smith and Stirling 1975, Smith 1980). The relationship between ringed seals and polar bears is so close that the abundance of ringed seals in some areas appears to regulate the density of polar bears, while polar bear predation in turn regulates density and reproductive success of ringed seals (Hammill and Smith 1991, Stirling and Øritsland 1995). Polar bears occasionally catch belugas (*Delphinapterus leucas*), narwhals (*Monodon monoceros*), walrus (*Odobenus rosmarus divirgens*), and harbor seals (*P. vitulina*) (Smith 1985, Calvert and Stirling 1990, Smith and Sjøre 1990, Stirling and Øritsland 1995, Derocher et al. 2002). Where common, bearded seals (*Erignathus barbatus*) can be a large part of polar bear diets, and are probably the second most common prey item (Derocher et al. 2002), and walrus can be seasonally important in some parts of the polar bear's range (Parovshchikov 1965, Ovsyanikov 1996).

Polar bears rarely catch seals on land or in open water (Furnell and Oolooyuc 1980); rather they catch seals and other marine mammals at the air-ice-water interface, where aquatic mammals come to breathe (Amstrup et al. 2007). Although there are local exceptions, it appears that polar bears gain little overall benefit from alternate foods (Amstrup et al. 2007). Therefore, maintenance of polar bear populations is dependent upon marine prey, largely ringed seals, and polar bears are tied to the surface of the ice for effective access to that prey (Amstrup et al. 2007).

Polar bears have an intrinsically low reproductive rate characterized by late age of sexual maturity, small litter sizes, and extended maternal investment in raising young. Female polar bears enter a prolonged estrus between March and June, when breeding occurs. Ovulation is thought to be induced by mating (Wimsatt 1963, Ramsay and Dunbrack 1986, Derocher and Stirling 1992). Implantation is delayed until autumn, and gestation is 195-265 days (Uspenski 1977), with active development of the fetus suspended for most of that time. The timing of implantation, and hence birth, is likely dependent upon body condition of the female, which in turn is dependent upon a variety of environmental factors (Schliebe et al. 2006). In the Beaufort Sea many pregnant females did not enter dens until late November or early December (Amstrup and Gardner 1994).

Throughout their range, most pregnant female polar bears excavate dens in snow located on land during September – November after drifts large enough to excavate a snow cave have formed (Harington 1968, Lentfer and Hensel 1980, Ramsay and Stirling 1990, Amstrup and Gardner 1994). In the southern Beaufort Sea a portion of the population dens in snow caves located on pack and shorefast ice. Successful denning by polar bears requires an accumulation of sufficient snow combined with winds to cause snow accumulation leeward of topographic features that create denning habitat (Harington 1968). The common characteristic of all denning habitat is topographic features that catch snow in the autumn and early winter (Durner et al. 2003).

Satellite telemetry studies determined mean dates of den entry in the Beaufort Sea were 11 and 22 November for land ( $n = 20$ ) and pack-ice ( $n = 16$ ), respectively (Amstrup and Gardner 1994). Female bears foraged until den entry. Mean date of emergence was 26 March for pack-ice dens ( $n = 10$ ) and 5 April for land dens ( $n = 18$ ). Messier et al. (1994) reported mean date of den entry and exit varied among years depending upon sea ice, snow and weather conditions. For bears denning on sea ice or moving from sea ice to land denning habitat, time of sea ice consolidation can alter the onset of denning. Sea-ice dens must be in ice stable enough to stay intact for up to 164 days while possibly moving hundreds of kilometers by currents (Amstrup 2003, Wiig 1998).

Polar bear denning habitat in Alaska includes areas of low relief topography characterized by tundra with riverine banks within approximately 50 km of the coast (Amstrup 1993, Amstrup and Gardner 1994, Durner et al. 2001, 2003), and offshore pack ice pressure ridge habitat. Although the northern Alaskan coast gets minimal snow fall, because the landscape is flat the snow is blown continuously throughout the winter creating drifts in areas of relief.

Insufficient data exist to accurately quantify polar bear denning locations along the Alaskan Chukchi Sea coast; however, dens in the area are 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.

Data suggests that an increasing number of SBS females are denning on land. Sixty percent of radio-collared females denned on land from 1996 – 2006, compared to forty percent in the previous 15 years (Fishbach et al. 2007). The geographic distribution of land denning also appears to have shifted to the west in recent years (71 FR 148, August 2, 2006).

Fidelity to denning locales was investigated by Amstrup and Garner (1994), who located 27 females at up to four successive maternity dens. Bears that denned once on pack ice were more likely to den on pack ice than on land in subsequent years. Similarly, bears were faithful to general geographic areas – those that denned once in the eastern half of the Alaska coast were more likely to den there than to the west in subsequent years. Annual variations in weather, ice conditions, prey availability, and the long-distance movements of polar bears (Amstrup et al. 1986, Garner et al. 1990) make recurrence of exact denning locations unlikely.

Polar bears give birth in the dens during mid-winter (Harington 1968, Ramsay and Dunbrack 1986). Survival and growth of the cubs depends on the warmth and stable environment within the maternal den (Blix and Lentfer 1979). Family groups emerge from dens in March and April when cubs are about three months old and able to survive outside weather conditions (Blix and Lentfer 1979, Amstrup 1995).

Newborn polar bears are very small, weighing approximately 0.6 kg (Blix and Lentfer 1979), and nurse from their hibernating mothers. Cubs grow quickly and may weigh 10-12 kg by the time they emerge from the den about three months later. Young bears stay with their mothers until weaned, which occurs most commonly in early spring when the cubs are 2.3 years of age. Female polar bears are available to breed again after cubs are weaned. Therefore, in most areas, the minimum successful reproductive interval for polar bears is 3 years (Schliebe et al. 2006).

Age of maturation of mammals is often associated with a threshold body mass (Sadleir 1969), and in polar bear populations it appears to be largely dependent on numbers and productivity of ringed seals. In the Beaufort Sea, ringed seal densities are lower in some areas of the Canadian High Arctic and Hudson Bay. As a possible consequence, female polar bears in the Beaufort Sea usually do not breed for the first time until they are 5 years of age (Lentfer and Hensel 1980), giving birth for the first time at 6 years of age.

Litter size and reproduction rates vary by geographic area and may change in response to hunting pressure, environmental factors, and other population perturbations. Litters of two cubs are common (Schliebe et al. 2006), with litters of three cubs occurring sporadically across the Arctic and most commonly reported in the Hudson Bay region (Stirling et al. 1977, Ramsay and Stirling 1988, Derocher and Stirling 1992). Average litter size across the species' range varied from 1.4 to 1.8 cubs (Schliebe et al. 2006), and several studies have linked reproduction to availability of seal prey, especially in the northern portion of their range. Body weights of mother polar bears

and their cubs decreased markedly in the mid-1970s in the Beaufort Sea following a decline in ringed and bearded seal pup production (Stirling et al. 1976, 1977, Kingsley 1979, DeMaster et al. 1980, Stirling et al. 1982, Amstrup et al. 1986). Declines in reproductive parameters varied by region and year with ice conditions and the corresponding reduction in numbers and productivity of seals (Amstrup et al. 1986). In the Beaufort Sea, female polar bears produce a litter of cubs at an annual rate of 0.25 litters per adult female (Amstrup 1995).

Polar bear reproduction lends itself to early termination without extensive energetic investment by the female (Ramsay and Dunbrack 1986, Derocher and Stirling 1992). Female polar bears may defer reproduction in favor of survival when foraging conditions are difficult (Derocher et al. 1992). Repeated deferral of reproduction could cause a decline in populations with an intrinsically low rate of growth (Schliebe et al. 2006).

Polar bears are long-lived animals; the oldest known female polar bear in the wild was 32 years and the oldest known male was 28, although few bears in the wild live beyond 20 years (Stirling 1990). Taylor et al. (unpublished data) described survival rates that generally increased by age class up to approximately 20 years of age (cubs-of-the-year 35-75%; 1-4 year old bears 63-98%; adults 5-20 years 95-99%; and 72-99% for adults > 20 years of age).

Survival of cubs is dependent upon their weight when they exit maternity dens (Derocher and Stirling 1992), and most cub mortality occurred early in the period after emergence from the den (Amstrup and Durner 1995, Derocher and Stirling 1996), with early age mortality generally associated with starvation (Derocher and Stirling 1996). Survival of cubs to weaning stage (generally 27-28 months) is estimated to range from 15% to 56% of births (Schliebe et al. 2006). Subadult survival rates are poorly understood because telemetry collars cannot be used on rapidly growing individuals.

Population age structure data indicate subadults 2-5 years survive at lower rates than adults (Amstrup 1995), probably because their hunting and survival skills are not fully developed (Stirling and Latour 1978). Eberhardt (1985) hypothesized adult survival rates must be in the upper 90% range to sustain polar bear populations. Studies using telemetry monitoring of individual animals (Amstrup and Durner 1995) estimated adult female survival in prime age groups may exceed 96%, and survival estimates are a reflection of the characteristics and qualities of an ecosystem to maintain the health of individual bears (Schliebe et al. 2006). Polar bears that avoid serious injury may become too old and feeble to hunt efficiently.

#### *Abundance and Trends – Alaska Stocks*

A reliable population estimate for the Chukchi Sea stock currently does not exist (USFWS 2009c). 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 combined Alaska-Chukotka polar bear harvest is currently believed to exceed sustainable levels, and the status of the CS polar bear population is considered uncertain or declining (Schliebe et al. 2006).

The size of the SBS population was estimated at 1,800 animals in 1986 (Amstrup et al. 1986). A new population assessment derived from capture-recapture data collected during 2001 to 2006 concluded there were 1,526 (95% CI = 1,211 - 1,841) polar bears in the region in 2006 (Regehr et al. 2006). The most recent stock assessment estimated a population size of 1,526 bears (USFWS 2009d).

The SBS stock experienced little or no growth during the 1990s (Amstrup et al. 2001). Declining survival, recruitment, and body size (Regehr et al. 2006, 2007), low growth rates during years of reduced sea ice during summer and fall (2004 and 2005), and an overall declining growth rate of 3% per year from 2001-2005 (Hunter et al. 2007), indicate the SBS stock population is declining.

#### **4. ENVIRONMENTAL BASELINE**

Regulations implementing the ESA (50 CFR §402.02) define the environmental baseline to include the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area. Also included in the environmental baseline are anticipated impacts of all proposed Federal projects in the Action Area that have undergone section 7 consultation and the impacts of State and private actions contemporaneous with the consultation in progress. The environmental baseline provides the context within which the effects of the Action will be analyzed and evaluated.

##### **4.1 Spectacled and Steller's Eiders**

###### *Status in the Action Area*

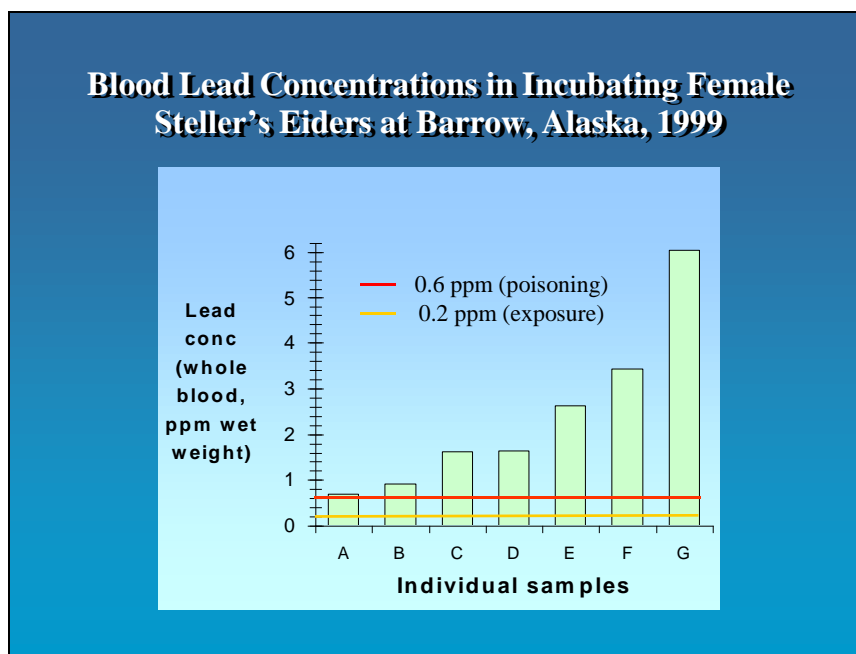
The North Slope-breeding population of spectacled eiders (approximately 12,916 breeding birds) and Steller's eiders (approximately 576 breeding birds) occupy terrestrial and marine parts of the Action Area for significant portions of their life history. Spectacled eiders breed, molt, and migrate in the Action Area, and Steller's eiders breed and migrate in the Action Area. Spectacled eiders nest throughout much of the ACP, whereas Steller's eiders have limited distribution across the ACP and highest breeding density near Barrow. Neither species is present in the Action Area from approximately November 15 to April 15. Both species have undergone significant, unexplained declines in their Alaska-breeding populations. Factors that may have contributed to the current status of spectacled and Steller's eiders are discussed below and include, but are not limited to, toxic contamination of habitat, increased predator populations, harvest, and impacts of development, science impacts, and climate change. Factors that affect adult survival may be most influential on population growth rates. Recovery efforts for both species are underway in portions of the Action Area.

###### *Toxic Contamination of Habitat*

The deposition of lead shot in tundra or nearshore habitats used for foraging is a threat for spectacled and Steller's eiders. Lead poisoning of spectacled eiders has been documented on the Y-K Delta (Franson et al. 1995, Grand et al. 1998) and Steller's eiders on the ACP (Trust et al. 1997; Service unpublished data). Figure 4.1 shows blood lead concentrations of 7 female

Steller's eiders nesting near Barrow in 1999; all had concentrations that reflected exposure ( $> 0.2$  ppm lead) and indicated poisoning ( $> 0.6$  ppm). Lead isotope tests confirmed the lead in the Steller's eider blood was of lead shot origin, not naturally occurring forms found in sediments where Steller's eiders occur (Angela Matz, USFWS, unpublished data).

Use of lead shot for hunting waterfowl is prohibited statewide, and for hunting all birds on the North Slope. Hunter outreach programs are being undertaken to reduce illicit use of lead shot on the North Slope.



**Figure 4.1 - Blood lead concentrations in incubating female Steller's eiders at Barrow, 1999 (Service data)**

Water birds in arctic regions are also exposed to global contamination, including radiation, and industrial and agricultural chemicals that can be transported by atmospheric and marine transport. Twenty male spectacled eiders wintering near St. Lawrence Island examined for the presence and effects of contaminants were in good condition, but had high concentrations of metals and subtle biochemical changes that may be associated with long-term health effects (Trust et al. 2000).

#### *Increased Predator Populations*

There is some evidence that predator and scavenger populations may be increasing on the North Slope near sites of human habitation, such as villages and industrial infrastructure (Eberhardt et al. 1983, Day 1998, Powell and Bakensto 2009). Researchers have proposed that reduced fox trapping, anthropogenic food sources in villages and oil fields, and nesting/denning sites on human-built structures have resulted in increased fox, gull, and raven numbers (R. Suydam and D. Troy *pers. comm.*, Day 1998). These anthropogenic influences on predator populations and predation rates may have affected eider populations, but this has not been substantiated.

However, increasing predator populations are a concern, and Steller's eider studies at Barrow attributed poor breeding success to high predation rates (Obritschkewitsch et al. 2001), and in years where arctic fox removal was conducted at Barrow prior to and during Steller's eider nesting, nest success appears to have increased significantly (Rojek 2008, Service data).

### *Harvest*

Hunting for spectacled and Steller's eiders was closed in 1991 by Alaska State regulations and Service policy, and outreach efforts have been conducted by the North Slope Borough, BLM, and Service to encourage compliance. Recent harvest data indicate that listed eiders continue to be taken during subsistence hunting on the North Slope. Although estimates of the number taken are imprecise, the Service is concerned about the scale of impacts, particularly for Steller's eiders. Continued efforts to eliminate harvest are being implemented in North Slope villages, and particularly at Barrow, where the greatest known concentrations of listed Steller's eiders occur. Intra-service consultations for the Migratory Bird Subsistence Hunting Regulations are conducted annually and harvest of all species, included listed eiders, is being monitored.

### *Impacts from Development and Disturbance*

With the exception of contamination by lead shot, destruction or modification of North Slope nesting habitat of listed eiders has been limited to date, and is not thought to have played a major role in population declines of spectacled or Steller's eiders. While development activities may adversely affect listed eiders, these species were not listed as a result of the impacts of development. Until recently eider breeding habitat on the ACP was largely unaltered by humans, but limited portions of each species' breeding habitat have been impacted by fill of wetlands, the presence of infrastructure that presents collision risk, and other types of human activity that may disturb birds or increase populations of nest predators. These impacts have resulted from the gradual expansion of communities, coupled with cold war era military developments such as the Distant Early Warning (DEW) Line sites at Cape Lonely and Cape Simpson (*circa* 1957), and, more recently, the initiation and expansion of oil development since construction of the Prudhoe Bay field and Trans Alaska Pipeline System (TAPS) in the 1970s.

Oil development is gradually spreading westwards across the North Slope from the original hub at Prudhoe Bay. Given industry's interest in NPR-A as expressed by lease sales, seismic surveys, drilling of exploratory wells, and the construction of the Alpine field, expansion of industrial development is likely to continue. Development in NPR-A may also facilitate development in more remote, currently undeveloped areas such as the Chukchi Sea Program Area or additional areas of the Beaufort Sea Program Area, and vice versa.

Development and other activities that may adversely affect listed eiders undergo a section 7 consultation, and the amount of impact is estimated in order to issue an Incidental Take Statement and a non-jeopardy conclusion. Table 4.1 summarizes recent activities in the Action Area, which required formal section 7 consultations and the estimated incidental take of listed eiders. These actions were all considered in the final jeopardy analysis of this BO. It should be noted that incidental take is estimated prior to the implementation of reasonable and prudent measures and associated terms and conditions that aim to reduce the levels of incidental take. Further, for some actions included in this table estimated take is likely to occur over the life of

the project (often 30–50 years) rather than annually or during single years, thereby reducing the severity of the impact to the population. There are also important differences in the type of incidental take. The majority of the incidental take estimated is a loss of eggs/ducklings, which, it is important to note, is of much lower significance for survival and recovery of the species than the death of an adult bird.

For example, spectacled eider nest success recorded on the Y-K Delta ranged from 18-73% (Grand and Flint 1997). From the nests that survived to hatch, spectacled eider duckling survival to 30-days on the Y-K Delta ranged from 25-47% (Flint et al. 2000). Over-winter survival of one-year old spectacled eiders was estimated at 25% (Flint pers. comm.), and annual survival of 2-year old birds (that may enter the breeding population) 80% (Grand et al. 1998). Using these data we estimate for every 100 spectacled eider eggs laid on the Y-K Delta, at most between 1 and 7 may survive and enter the breeding population. Similarly, we expect that only a small proportion of spectacled eider eggs or ducklings on the North Slope would eventually survive to maturity, and it is likely a similar small proportion of Steller's eider eggs survive to become mature adults.

**Table 4.1 - Activities on Alaska's North Slope or adjacent areas that required formal section 7 consultation and the amount of incidental take provided.**

<b>Project Name</b>	<b>Impact Type</b>	<b>Project Life</b>	<b>Estimated Incidental Take</b>
Alpine Development Project	Habitat Loss Collisions	30 years	4 spectacled eider eggs/ducklings 3 adult spectacled eiders
Barrow Airport Expansion	Habitat Loss	50 years	14 spectacled eider eggs/ducklings 29 Steller's eider eggs/ducklings
Barrow Hospital	Habitat Loss	33 years	2 spectacled eider eggs/ducklings 17 Steller's eider eggs/ducklings
Barrow Landfill	Habitat Loss	Unknown	1 spectacled eider nest/ year 1 Steller's eider nest/year
Barrow Artificial Egg Incubation	Removal of eggs for captive breeding program	1 year	Maximum of 24 Steller's eider eggs



Barrow Tundra Manipulation Experiment	Habitat Loss Collisions	4 years	2 spectacled eider eggs/ducklings 1 Steller's eider eggs/ducklings 2 adult spectacled eiders 2 adult Steller's eiders
Barrow Global Climate Change Research Facility Phase I & II	Habitat Loss Collisions	50 years	6 spectacled eider eggs/ducklings 25 Steller's eider eggs/ducklings 1 adult spectacled eider 1 adult Steller's eider
Barrow Wastewater Treatment Facility	Habitat Loss	33 years	3 Steller's eider eggs/ducklings 3 spectacled eider eggs/ducklings
ABR Avian Research/USFWS Intra-Service Consultation	Disturbance	1 year	5 spectacled eider eggs/ducklings
Pioneer's Oooguruk Project	Habitat Loss Collisions	30 years	3 spectacled eider eggs/ducklings 3 adult spectacled eiders
BP's 69Kv Powerline	Collisions	50 years	10 adult spectacled eiders over 50 years
BP's Liberty Project	Habitat Loss Collisions	30 years	2 spectacled eider eggs/ducklings 1 adult spectacled eider
Intra-service on Subsistence Hunting Regulations 2008		1 year	0 birds
Intra-service on Subsistence Hunting Regulations 2009		1 year	0 birds
BP Alaska's Northstar Project	Collisions	16 years	≤ 2 adult spectacled eiders/year ≤ 1 adult Steller's eider/year

KMG Nikaitchuq Project	Habitat Loss Collisions	30 years	2 spectacled eiders/year 7 adult spectacled eiders over 30 years
Intra-Service Consultation 2007 on MBM Avian Influenza Sampling	Disturbance	1 year	6 spectacled eider eggs/ducklings
BLM 2007 Programmatic on Summer Activities in NPR-A	Disturbance	1 year	21 spectacled eider eggs/ducklings
BLM 2008 Programmatic on Summer Activities in NPR-A	Disturbance	1 year	56 spectacled eider eggs/ducklings
BLM 2009 Programmatic on Summer Activities in NPR-A	Disturbance	1 year	49 spectacled eider eggs/ducklings
BLM Northern Planning Areas of NPR-A	Disturbance Collision	50 – 100 years (no work has started)	87 spectacled eider eggs/ducklings/year 12 Steller's eider eggs/ducklings/year < 7 adult spectacled eiders < 1 adult Steller's eider
MBM/USFWS Intra-Service Consultation 2008	Disturbance	1 year	21 spectacled eider eggs/ducklings
NOAA National Weather Service Office in Barrow	Habitat Loss Disturbance Collision	30 years	< 4 spectacled eider eggs/ducklings < 10 Steller's eider eggs/ducklings 1 adult Steller's eider
Intra-Service on Dr. Peterson's 2009 PTT project	Loss of Production Capture/Surgery	1 year	130 spectacled eider eggs/ducklings 4 adult spectacled eiders

Table 4.1 illustrates the number and diversity of actions that required consultation in the Action Area. We believe these estimates have overestimated, and likely in some cases significantly overestimated, actual take. Actual take is likely reduced by the implementation of terms and

conditions in each BO. For multi-year projects take is spread over the project life-span (often 50 years) and would not occur all at once. Additionally, take estimates are dominated by the *potential* loss of eggs/ducklings which, as described above, is of less significance than adult mortality for survival and recovery of these K-selected species. Also, the degree to which spectacled and Steller's eiders potentially affected by disturbance can actually reproduce in either disturbed areas or less disturbed areas they have moved to is unknown. Disturbance *may* result in decreased production of eggs/chicks, based on the conservative assumptions that activities at the site will completely displace birds in an area 200 m around the site, and displaced birds will fail to breed. Further, no collision mortalities have been detected despite on-going project by project monitoring efforts. Overall, these estimates are likely significant over-estimates of take as conservative assumptions were made throughout the development of these incidental take estimates (e.g., USFWS 2008c).

### *Science Impacts*

Scientific, field-based research is also increasing in arctic Alaska as interest in climate change and its effects on high latitude areas continues. While many of these activities have no impacts on listed eiders, as they occur in seasons when eiders are absent from the area or use remote sensing tools, on-the-ground activities and tundra aircraft landings likely disturb a small number of listed eiders each year.

### *Climate Change*

High latitude regions, such as Alaska's North Slope, are thought to be especially sensitive to the effects of climate change (Quinlan et al. 2005; Schindler and Smol 2006; Smol et al. 2005). While climate change will likely affect individual organisms and communities, it is difficult to predict with specificity or reliability how these effects will manifest. Biological, climatological, and hydrologic components of the ecosystem are interlinked and operate on multiple spatial, temporal, and organizational scales with feedback between the components (Hinzman et al. 2005).

There are a wide variety of changes occurring in the arctic worldwide, including Alaska's North Slope. Arctic landscapes are dominated by lakes and ponds (Quinlan et al. 2005), such as those used by listed eiders for feeding and brood rearing. In many areas these arctic water bodies are draining and drying out during summer as the underlying permafrost thaws (Smith et al. 2005; Oechel et al. 1995), and are losing water through increased evaporation and evapotranspiration resulting from longer ice-free periods, warmer temperatures, and longer growing seasons (Schindler and Smol 2006; Smol and Douglas 2007). Productivity of lakes and ponds appears to be increasing as a result of nutrient inputs from thawing soil and an increase in degree days (Quinlan et al. 2005; Smol et al. 2005; Hinzman et al. 2005; Chapin et al. 1995). Changes in water chemistry and temperature are also resulting in changes in the algal and invertebrate communities that form the basis of the food web in these areas (Smol et al. 2005; Quinlan et al. 2005).

With the reduction in summer sea ice, the frequency and magnitude of coastal storm surges has increased. These often result in breaching of lakes and low-lying coastal wetland areas, killing salt-intolerant plants and altering soil and water chemistry, and hence, the fauna and flora of the

area (USGS 2006). Historically, sea ice has served to protect shorelines from erosion; however, this protection has decreased as sea ice decreases in extent and duration. Coupled with softer, partially thawed permafrost, the lack of sea ice has significantly increased coastal erosion rates (USGS 2006), potentially reducing available coastal tundra nesting habitat.

Changes in precipitation patterns, air and soil temperature, and water chemistry are also affecting tundra vegetation communities (Hinzman et al. 2005; Prowse et al. 2006; Chapin et al. 1995), and boreal species are expanding their ranges into tundra areas (Callaghan et al. 2004). Changes in the distribution of predators, parasites, and disease-causing agents resulting from climate change may have significant effects on listed species and other arctic fauna and flora. Climate change may also result in mismatched timing of migration and development of food in arctic ponds (Callaghan et al. 2004), and changes in the population cycles of small mammals such as lemmings to which many other species, including nesting Steller's eiders (Quankenbush and Suydam 1999), are linked (Callaghan et al. 2004).

There are indications regional-scale environmental shifts may be underway in both the Chukchi and the Bering seas, which have important hydrologic and biologic connections. An observed increase in Atlantic water in the western Arctic Ocean (Zangh and Hunke 2001) can warm surface water, which in turn thins arctic sea ice (Manabe and Stouffer 1995). An average 1-m reduction in sea ice thickness has been estimated in the Chukchi and Beaufort seas (Rothrock et al 1999). Late summer arctic sea ice has declined 2-7.7% per decade (Parkinson et al. 1999, Stroeve et al. 2005), and the area of perennial sea ice has declined 9.8% per decade since 1978 (Comiso 2006). Sea ice and the associated ice-edge productivity is a key factor in the heightened carrying capacity of arctic sea shelves (Grebmeier and Dunton 2000), including the LBCHU. Grebmeier et al. (2006) suggest that an ecological shift from arctic to subarctic conditions is occurring in the northern Bering Sea; this shift resulting in decreased sea ice may have profound impacts on arctic marine mammals and diving seabird populations through ecosystem linkages that change food supplies. A similar trend may be underway in the Chukchi Sea as recent retrospective studies of benthic communities indicate a changing marine system in both the Bering and Chukchi Seas (Iken and Konar 2003, Sirenko and Koltun 1992, Grebmeier and Dunton 2000). There are indications bivalve populations in the northern Bering Sea (where spectacled eiders winter) are in decline (Richman and Lovvorn 2003, Grebmeier and Cooper 2004).

Current understanding of regional-scale shifts in the arctic marine environment is primarily limited to measurements in the physical environment, such as sea ice thickness and water temperatures. Because similar types of changes are recently being linked to ecologic shifts in the Bering Sea (Grebmeier et al. 2006), it may be reasonable to conclude unmeasured ecological shifts may be occurring in the Chukchi and Beaufort seas, or will occur, if trends continue.

While the impacts of climate change on listed species in the Action Area are unclear, species with small populations are more vulnerable to environmental change (Crick 2004). Some species may increase in abundance or range with climate change, while others will suffer from reduced population size or range. The ultimate effects of climate change that will impact both the terrestrial and marine habitats of listed eiders are undetermined at present. While it is certain

that listed eiders will be impacted by the effects of climate change on their terrestrial and marine habitats, at this time we are unable to predict with reasonable reliability the direction or magnitude of these individual impacts or their combined sum.

## **4.2 Yellow-billed Loons**

### *Status in the Action Area*

The majority, 2,500-3,500 of the estimated 3,000-4,000 Alaska-breeding yellow-billed loons nest on the ACP, within the Action Area.

The ACP breeding population and likely significant numbers of yellow-billed loons nesting in Arctic Canada migrate through the Action Area as they move between wintering and breeding areas. Yellow-billed loons are absent from the Action Area in winter. In designating the yellow-billed loon as a candidate, the Service considered the best available data about factors that could affect their populations. Factors that may be affecting yellow-billed loons in the Action Area are thought to include harvest, oil and gas development, and climate change, and conservation efforts. These are discussed below.

### *Harvest*

Subsistence harvest surveys have indicated a substantial level of harvest of yellow-billed loons relative to their population, although exact harvest numbers are uncertain (USFWS 2009e). There is no legal harvest of yellow-billed loons allowed in the United States except in Alaska's North Slope Region where a total of up to 20 yellow-billed loons per year may be kept if inadvertently caught in subsistence fishing nets and used for subsistence purposes. Harvest reports, however, suggest that yellow-billed loons are being harvested at levels higher than this in the Action Area, as well as in other areas of their Alaskan range, often by shooting (USFWS 2009e).

A population model developed by U.S. Geological Survey (USGS) tested the sensitivity or response of the population to a range of possible harvest levels and found that for all harvest level and population size scenarios considered, harvest would cause an otherwise stable population to decline (Schmutz 2009). Outreach and education efforts by the Service to reduce harvest levels are underway.

### *Oil and Gas Development*

Over 90% of yellow-billed loons nesting on the ACP nest within NPR-A. Although loons as a genus are susceptible to disturbance, disturbance and habitat degradation that may result from oil and gas development in NPR-A would largely be mitigated by BLM's stipulations and required operating procedures (USBLM 2004; USBLM 2008). Both non-nesting and breeding yellow-billed loons on Alaska's ACP use marine areas of the Beaufort and Chukchi seas to forage. Additionally, in spring yellow-billed loons gather in polynyas, ice leads, and open shorelines near river deltas offshore of breeding areas prior to dispersing to nesting grounds. Thus yellow-billed loons are at risk from spills of crude and refined oils that may result from oil and gas development in the area. Water withdrawal from freshwater lakes to construct ice roads and pads, or supply exploration camps may adversely affect nesting habitat. However, the Service

believes regulations by the State of Alaska and in NPR-A by BLM will prevent any significant adverse effects to yellow-billed loons from water withdrawal activities (USFWS 2009e).

#### *Climate Change*

As described above for listed eiders, the effects of climate change to yellow-billed loon habitat in both the terrestrial arctic and marine systems is complex, with highly variable predictions of effects. Perhaps the greatest concern is potential effects of climate change on morphology and characteristics of breeding lakes and their prey-fish communities (USFWS 2009e). Potential climate change effects that may affect yellow-billed loons are similar to those described above for listed eiders.

#### *Conservation Efforts*

In 2006, the Service, National Park Service, Alaska Department of Natural Resources, Alaska Department of Fish and Game, Bureau of Land Management, and the North Slope Borough entered into a “Conservation Agreement for the Yellow-billed Loon (*Gavia adamsii*).” The agreement specifies the goal of protecting the yellow-billed loon and its habitat in Alaska and identifies several strategies for achieving this goal. These strategies include: (1) implement specific actions to protect yellow-billed loons and their breeding habitats in Alaska from potential impacts of land uses and management activities, including oil and gas development; (2) inventory and monitor yellow-billed loon breeding populations in Alaska; (3) reduce the impact of subsistence activities (including fishing and hunting) on yellow-billed loons in Alaska; and (4) conduct biological research on yellow-billed loons, including response to management actions. The Conservation Agreement partners have continued collaborating to collect and refine information about the yellow-billed loon to help guide future management. For example, BLM has proactively worked with loon experts and the Service to identify appropriate protections for the species and its habitat. Those protections were incorporated into their Records of Decision for NPR-A, and in the commitments they made in the Conservation Agreement.

### **4.3 Kittlitz’s Murrelet**

Kittlitz’s murrelets are closely associated with marine tidewater glaciers, and their decline may be related to the retreat of glaciers and decreased foraging habitat. At this time, the ultimate cause for the population decline of Kittlitz’s murrelet is unknown, but major threats appear to be habitat based, caused by one or a combination of mechanisms including: change to forage fish quality and availability due to rapid atmospheric and/or decadal oceanic climate change, and by contamination of the marine environment. Additive to this underlying stress to the population may be adult mortality from incidental bycatch in commercial fisheries, disturbance by tour boats, and predation (USFWS 2009a). The primary distribution and breeding range of Kittlitz’s murrelets occurs in southeast Alaska, outside of the Action Area. Activities in the Action Area are not thought to be impacting the decline, or recovery, of this species.

### **4.4 Ledyard Bay Critical Habitat Unit**

The 13,960 km<sup>2</sup> LBCHU was designated as critical habitat because it is used by large numbers of spectacled eiders during molt, which is an energetically demanding portion of their life cycle. Its

relatively rich and abundant benthic community is food for spectacled eiders when they occupy Ledyard Bay. Therefore, environmental conditions that support the rich and abundant benthic community are ultimately important to Ledyard Bay's capacity to support spectacled eiders. Due to the lack of industrial development and minimal human presence and vessel traffic in the region, the Chukchi Sea is currently largely in natural condition. Several key environmental factors, such as good water quality and lack of contamination, contribute to what can be considered the current good environmental conditions of the LBCHU.

Current industrial impacts are minimal and pollution and/or sediments occur at very low levels in the area. The majority of water flowing into this marine environment is not subject to human activity or stressors and is considered unimpaired (Alaska's Final 2002/2003 Integrated Water Quality Monitoring and Assessment Report). There are no Section 303(d) impaired waterbodies identified within the Arctic Subregion by the State of Alaska. Background hydrocarbon concentrations in Chukchi Sea appear to be biogenic (naturally occurring ) and on the order of 1 part per billion or less; concentrations in the Hope Basin and Chukchi Sea are entirely biogenic in origin and are typical of levels found in unpolluted marine water and sediments. A study of heavy metals in sediments collected from portions of the eastern Chukchi in the 1990's (Naidu 2005) found concentrations were low and the environment was considered "pristine."

We believe, therefore, that the LBCHU is currently largely in natural condition, free of physical modification or significant pollutants in either its water and sediments; and its physical and biological processes are functioning and promote production of a rich and abundant benthic community upon which spectacled eiders feed when they occupy the LBCHU.

#### **4.5 Polar Bears**

##### *Status in the Action Area*

Polar bears spend the majority of their time on ice in near-shore, shallow waters over the productive continental shelf. Polar bears are generally widely and sparsely distributed across the Alaskan portion of the Beaufort and Chukchi seas. Unlike polar bears in eastern Canada, the Alaskan stocks do not currently spend extended periods of time on land (Garner et al. 1990). However, polar bears have been observed congregating on the barrier islands in the fall and winter feeding on bowhead whale (*Balaena mysticetus*) carcasses, notably at Cross and Barter islands (USFWS 2006d), where Alaska Native subsistence whale hunts occur.

Only pregnant female polar bears den; other members of the population (males, solitary females, and females with older cubs) remain active throughout winter. Some females from the Chukchi Sea and Southern Beaufort Sea stocks may den in the Action Area. Durner et al. (2006) found approximately 50% of pregnant females in the Beaufort Sea came ashore to construct maternity dens, while Amstrup and Gardner (1994) found 42% of females observed in the Alaskan Chukchi and Beaufort seas and Canadian Beaufort Sea from 1983-1991 denned on land. The most recent data (Fishbach et al. 2007) suggests 60% of females in these areas den on land, while the remaining females denned on shore-fast ice, or drifting pack ice.

Females come ashore to den in late October/early November depending upon ice movements and timing of freeze up (Lentfer and Hensel 1980). In Alaska, dens are sparsely distributed along a narrow coastal strip with sightings reported up to 48 km inland (Lentfer and Hensel 1980) and 61 km inland (Amstrup and Gardner 1994). Denning habitat includes areas such as coastal and river banks and bluffs where snow accumulates early.

Whereas loss of sea ice habitat is considered the principle threat to polar bears, other threats occurring in the Action Area, include hunting, development, environmental contaminants, disease, and predation could impact the species.

### *Hunting*

Prior to the 1950s, most hunting was by indigenous people for subsistence purposes. Increased sport hunting in the 1950s and 1960s resulted in population declines (Prestrud and Stirling 1994). International concern about the status of polar bears resulted in biologists from the five polar bear range nations forming the Polar Bear Specialist Group (PBSG) within the IUCN SSC (Servheen et al. 1999). The PBSG was largely responsible for the development and ratification of the 1973 International Agreement on the Conservation of Polar Bears (1973 Polar Bear Agreement), which called for international management of polar bear populations based on sound conservation practices. It prohibits polar bear hunting except by local people using traditional methods, calls for protection of females and denning bears, and bans use of aircraft and large motorized vessels to hunt polar bears. The PBSG meets every 3-5 years to review all aspects of polar bears science and management, including harvest management.

Additionally, since passage of the Marine Mammal Protection Act in 1972 (MMPA), the sport hunting of polar bears in the United States has ceased. However, the MMPA provides a special exemption to Coastal dwelling Alaska Natives who may continue to take polar bears for subsistence or handicraft purposes. Currently, under the MMPA, there are no restrictions on the number, season, or age of polar bears that can be harvested by Alaska Natives. However, there is a more restrictive Native-to-Native agreement between Inūpiat from Alaska and Inuvialuit in Canada that was developed in 1988. This agreement, the Inuvialuit-Inūpiat Polar Bear Management Agreement, established quotas and recommendations concerning protection of denning females, family groups, and methods of take. Presently it is thought that the current harvest levels, which have averaged 36 bears per years since 1980, will not impact the rate of recovery of the species (USFWS 2006d).

An estimated 60 to 100 polar bears from the shared Russian–United States Chukchi Sea stock are also harvested every year (Evans et al. 2003). In 2000, the United States and the Russian Federation signed the Agreement on the Conservation and Management of the Alaska-Chukotka Polar Bear Populations. This agreement supports polar bear hunting for Alaskan and Russian Natives, and provides a framework for future management, enforcement, and allocation of harvest between the two countries (Evans et al. 2003). There is, however, concern about potential over-harvest of polar bears from the shared US-Russian Chukchi Sea population (Schliebe et al. 2006), possibly related to illegal harvest of animals from this stock.



### *Development*

Documented impacts on polar bears by the oil and gas industry in Alaska during the past 30 years are minimal. Polar bears have been encountered at or near most coastal and offshore production facilities, or along roads and causeways that link these facilities to the mainland. However, interactions have been minimized by implementation of Incidental Take Regulations (ITRs) for the Beaufort Sea (USFWS 2006d) and Chukchi Sea (USFWS 2008d) and the associated Letters of Authorization (LOAs) issued under the MMPA. The ITRs only authorize non-lethal incidental take. No lethal take associated with the oil and gas industry has occurred during the period covered by ITRs (1991 until present) in either the Chukchi or Beaufort seas, although prior to issuance of these regulations, lethal takes of adults by industry were rare (two known occurrences in Alaska since 1968).

Females and young cubs denning on land can be vulnerable to disturbance from oil and gas activities. Amstrup (1993) concluded most females were relatively tolerant of human disturbance, although there was considerable variation in levels of response by individual bears. Females appear more likely to abandon their dens in the fall before cubs are born and relocate if disturbed (Lentfer and Hensel 1980, Amstrup 1993, Durner et al. 2006), than in the spring when young cubs are less likely to survive if they leave the maternal den early (Amstrup 1993).

Formal section 7 consultations have been conducted for the Chukchi Sea and Beaufort Sea ITRs, which authorize the incidental taking of a small number of polar bears in these seas and the adjacent Arctic Coastal Plain during oil and gas activities in arctic Alaska. In 2008 14 LOAs were issued under the Beaufort Sea ITRs and 4 under the Chukchi Sea ITRs. The BO for northern NPR-A evaluated potential impacts to polar bears from oil and gas development in that area, and the Liberty and Northstar BOs have been reevaluated to include an analysis of impacts of the projects to polar bears. These consultations and their conclusions were considered in the jeopardy analysis of this BO.

### *Environmental Contaminants*

Three main types of contaminants in the Arctic are thought to present the greatest potential threat to polar bears and other marine mammals: petroleum hydrocarbons, persistent organic pollutants (POPs), and heavy metals.

Potential exposure of polar bears to petroleum hydrocarbons comes from direct contact and ingestion of crude oil and refined products from acute and chronic oil spills. Polar bear range overlaps with many active and planned oil and gas operations within 40 km (25 mi) of the coast or offshore (Schliebe et al. 2006). To date, no major oil spills have occurred in the Alaska marine environment within the range of polar bears.

Polar bears could come in contact with oil spilled in the marine or land environment, or by ingesting contaminated prey (Neff 1990). Polar bears groom themselves regularly as a means to maintain the insulating properties of their fur, so oil ingestion would also be likely during grooming behavior by a fouled bear (Neff 1990). Polar bears are curious and are likely to investigate oil spills and oil contaminated wildlife. Although it is not known whether healthy polar bears in their natural environment would avoid oil spills and contaminated seals, bears that

are hungry are likely to scavenge contaminated seals, as they have shown no aversion to eating and ingesting oil (St. Aubin 1990, Derocher and Stirling 1991).

Due to the seasonal distribution of polar bears, the times of greatest impact from an oil spill are summer and autumn (Amstrup et al. 2000a). This is important because distributions of polar bears are not uniform through time. In fact, near-shore densities of polar bears are two to five times greater in autumn than in summer (Durner et al. 2000), and polar bear use of coastal areas during the fall open water period has increased in recent years in the Beaufort Sea. A large number of bears might be affected by a large oil spill in this area, particularly during the broken ice period. The number of polar bears affected by an oil spill could be substantially higher if the spill spread to areas of seasonal polar bear concentrations, such as the area near Kaktovik, in the fall where polar bears congregate at bowhead whale carcasses. Industrial development in polar bear habitat may also expose individuals to other hazardous substances through improper storage or spills. For example, one polar bear died in Alaska from consuming ethylene glycol in 1988 (Amstrup et al. 1989).

Contamination of the Arctic and sub-Arctic regions through long-range transport of pollutants has been recognized for over 30 years (Bowes and Jonkel 1975, Proshutinsky and Johnson 2001, Lie et al. 2003). The Arctic ecosystem is particularly sensitive to environmental contamination due to the slower rate of breakdown of POPs, including organochlorine compounds (OCs), relatively simple food chains, and the presence of long-lived organisms with low rates of reproduction and high lipid levels. The persistence and lipophilic nature of organochlorines increase the potential for bioaccumulation and biomagnification at higher trophic levels (Fisk et al. 2001). The highest concentrations of OCs have been found in species at the top of the marine food chains such as glaucous gulls, which scavenge on marine mammals, and polar bears, which feed primarily on seals (Braune et al. 2005). Consistent patterns between OC and mercury contamination and trophic status have been documented in Arctic marine food webs (Braune et al. 2005). The southern Beaufort Sea polar bear populations may have concentrations of mercury close to the toxicological threshold levels of 60 micrograms wet weight reported for marine mammals (AMAP 2005) above which an animal may exhibit adverse effects.

### *Disease*

Except for the presence of *Trichinella* larvae, the occurrence of diseases and parasites in polar bears is relatively rare compared to other bears. Polar bears feed primarily on fat which is relatively free of parasites, except for *Trichinella* (Rogers and Rogers 1976, Forbes 2000). It is unknown whether polar bears are more susceptible to new pathogens due to their lack of previous exposure to diseases and parasites. Many different pathogens and viruses have been found in seal species that are polar bear prey (Duignan et al. 1997, Measures and Olson 1999, Dubey et al. 2003, Hughes-Hanks et al. 2005), so the potential exists for transmission of these diseases to polar bears. As polar bears become more stressed from food shortages they may eat more of the intestines and internal organs than they do presently, thus increasing their potential exposure to parasites and viruses (Derocher et al. 2004).

### *Predation*

Polar bears have no predators but man and other polar bears (see *Hunting*, above). Intraspecific killing has been reported among all North American bear species. Reasons for intraspecific predation in bears species is poorly understood but thought to include population regulation, nutrition, and enhanced breeding opportunities in the case of predation of cubs. Although infanticide by male polar bears has been well documented (Hannsson and Thomassen 1983, Larsen 1985, Taylor et al. 1985, Derocher and Wiig 1999), it is thought that this activity does not account for a large percentage of the cub mortality. A potential reason for infanticide relates to density dependent mechanisms of population control as this behavior seems to occur more frequently with increasing population size (Derocher and Wiig 1999).

Cannibalism has been recently documented in polar bears (Derocher and Wiig 1999, Amstrup et al. 2006). Amstrup et al. (2006) observed three non-related instances of intraspecific predation and cannibalism in the southern Beaufort Sea during the spring of 2004. One incident was the first documented predation of an adult female in a den, the second was of a female and newly emerged cub from a den, and the third involved a yearling male. In a combined 58 years of research by the senior investigators similar observations had not taken place. Active stalking or hunting preceded the attacks and the killed bears were partially consumed. Adult males were believed to be the predator in the attacks. Amstrup et al. (2006) indicated that in general a greater portion of polar bears in the area where the predation occurred were in poor physical condition compared to other years. The authors hypothesized that adult males may be the first to show the effects of nutritional stress caused by significant ice retreat in this area (Skinner et al. 1998, Comiso and Parkinson 2004, Stroeve et al. 2005) because they feed less during the spring mating season and enter the summer in poorer condition than other sex/age classes. Derocher and Wiig (1999) documented a similar intraspecific killing and consumption of another polar bear in Svalbard, Norway, which was attributed to relatively high population densities and food shortages. Taylor et al. (1985) documented that a malnourished female killed and consumed her own cubs, and Lunn and Stenhouse (1985) found an emaciated male consuming an adult female polar bear. The potential importance of cannibalism and infanticide for population regulation is unknown. Given our current knowledge of disease and predation, we do not believe that these factors currently are having population-level effects. However, increased cannibalism in polar bears was postulated and thought to be a result of nutritional stress brought on by climate change (Derocher et al. 2004).

### *Climate Change*

Effects of sea ice loss on polar bear populations range-wide have been considered by the Service based upon recent information. In 2007, a USGS science team released 9 reports to the Service that included (1) new observational data on polar bears, including updated information on the current status of 3 of the world's 19 subpopulations of polar bears, and (2) projections of the future distribution and abundance of polar bears in the rest of the 21<sup>st</sup> century, given changes expected in future sea ice conditions. The reports are available at: [http://www.usgs.gov/newsroom/special/polar\\_bears/](http://www.usgs.gov/newsroom/special/polar_bears/).

The overall conclusion of the USGS research effort was that if projected changes in future sea ice conditions are realized, approximately two-thirds of the world's current polar bear population

will be lost by the mid-21<sup>st</sup> century. Because the observed trajectory of Arctic sea ice decline appears to be underestimated by currently available models, this assessment of future polar bear status may be conservative (Amstrup et al. 2007).

While climate change will have the largest impact on polar bears in the marine environment, it may also lead to changes in use and vulnerability of polar bears in the terrestrial environment. An estimated > 60% of females from the SBS stock den on land, with the remaining bears denning on drifting pack ice (Fischbach et al. 2007). Durner et al. (2006) noted that ice must be stable for ice-denning females to be successful. As climate change continues, the quality of sea ice may decrease, forcing more females to den on land (Durner et al. 2006). However, if large areas of open water persist until late winter due to a decrease in the extent of the pack ice, females may be unable to access land to den (Stirling and Andriashek 1992).

Climate change may affect the availability and quality of denning habitat on land. Durner et al. (2006) found that 65% of terrestrial dens found in Alaska between 1981 and 2005 were on coastal or island bluffs. These areas are suffering rapid erosion and slope failure as permafrost melts and wave action increases in duration and magnitude. In all areas, dens are constructed in autumn snowdrifts (Durner et al. 2003). Changes in autumn and winter precipitation or wind patterns (Hinzman et al. 2005) could significantly alter the availability and quality of denning habitat.

Polar bears' use of coastal habitats in the fall during open-water and freeze-up conditions has increased since 1992 (USFWS 2006d). This may increase the number of human – polar bear interactions if bears occur close to human settlements or development. Amstrup (2000) observed that direct interactions between people and bears in Alaska have increased markedly in recent years. The number of bears taken for safety reasons, based on three-year running averages, increased steadily from about 3-per-year in 1993, to about 12 in 1998, and has averaged about 10 in recent years. There are several plausible explanations for this increase. It could be an artifact of increased reporting, or of increased polar bear abundance and corresponding probability of interactions with humans. Alternatively, or in combination, polar bears from the SBS and CS populations typically move from the pack ice to the near shore environment in the fall to take advantage of the higher productivity of ice seals over the continental shelf. In the 1980s and early 1990s, the near shore environment would have been frozen by early or mid October, allowing polar bears to effectively access seals in the area. Since the late 1990s, the timing of ice formation in the fall has occurred later in November or early December, resulting in an increased amount of time that the area was not accessible to polar bears. Consequently, bears spent a greater amount of time on land and not feeding. The later formation of near-shore ice increases the probability of bear-human interactions occurring in coastal villages (Schliebe et al. 2006). Some experts predict the number of polar bear–human interactions will increase as climate change continues (Derocher et al. 2004).

## **5. EFFECTS OF THE ACTION ON LISTED SPECIES AND CRITICAL HABITAT**

### **5.1 Introduction**

This section of the BO analyzes direct and indirect effects and interrelated and interdependent effects of the Action on listed and candidate species, and the LBCHU. This section is divided into impacts anticipated in the first incremental step (seismic surveys and exploratory drilling), and impacts that may result from subsequent incremental steps (development onwards). Impacts are first described for listed eiders, yellow-billed loons, and Kittlitz's murrelets (avian species); then for the LBCHU; and finally for polar bears. Where appropriate, impacts are separated into those associated with the Beaufort Sea Program Area and those with the Chukchi Sea Program Area.

After reviewing the information provided by MMS, the Service considered the following potential effects to avian species that may result from the Action:

- Habitat loss
- Disturbance and displacement
- Increased subsistence hunting
- Crude and refined oil spills
- Toxic contamination
- Collisions
- Increased predation

And for polar bears:

- Habitat Loss
- Physical Obstructions
- Disturbance and displacement
- Human-polar bear interaction
- Crude and refined oil spills
- Toxic contamination
- Impacts to prey species

### **5.2 Effects of the First Incremental Step (Seismic Surveys and Exploratory Drilling)**

In the first incremental step activities are limited to seismic surveys and exploratory drilling, and their associated vessel and aircraft traffic.

#### **5.2.1 Avian Species**

##### Habitat Loss

Structures in high-quality habitats can affect birds by rendering those habitats permanently unsuitable, thus relegating birds to lower quality habitats. The only permanent structures expected to result from seismic surveys and exploratory drilling are abandoned exploratory wells. These wells are capped below the sea floor and therefore, would not cause permanent impacts to the sea floor. Thus, the Service concludes that permanent habitat loss from seismic surveys and exploratory drilling would not occur and no adverse impacts to listed or candidate species from habitat loss are anticipated.

### Disturbance and Displacement

The severity of disturbance and displacement effects depends upon the duration, frequency, and timing of the disturbing activity. Disturbance that results in agitated behavior, flushing, or other movements in response to a stimulus can increase energy costs, especially for birds that are already energetically stressed from cold, lack of food, or physiologically demanding life cycle stages such as molt. Birds may be displaced from preferred habitats to areas where resources are less abundant or are of lower quality.

Disturbance and displacement of listed eiders, yellow-billed loons, and Kittlitz's murrelets during seismic surveys and exploratory drilling activities could occur from aircraft, vessel traffic, and seismic survey acoustic sources, which are discussed below.

*Aircraft* – Aircraft may disturb molting and flight capable eiders. King eiders in western Greenland dove when survey aircraft approached (Mosbech and Boertmann 1999). Bird response varied with time of day, and increased with decreasing plane altitude. After a preliminary dive by nearly all birds, over 50% remained submerged until the plane passed. Also, molting king eiders appeared to be sensitive to boat and aircraft engine noise, and flushed, dove, or swam from that disturbance, sometimes leaving the area for several hours (Frimer 1994).

MMS anticipates low numbers of aircraft operations during seismic survey and exploratory drilling operations. Fixed-wing operations will likely be limited to marine mammal observation flights which take place at an altitude of 1,500 feet; because of this high altitude they are not anticipated to disturb and adversely affect listed or candidate species (Mosbech and Boertmann 1999).

Helicopters may be used to support seismic vessels travelling from a shore facility to the vessel. The number of flights is estimated at < 1/day for each seismic survey (MMS *pers. comm.*). During open water exploratory drilling activities MMS estimates 1-3 helicopter flights/day will occur for each drill rig operation (estimated at two drill rigs operating in each sea/year). These aircraft will transport personnel and supplies between drill ships and land, likely Barrow for operations in the Chukchi Sea and Deadhorse for operations in the Beaufort Sea. In order to avoid impacts to listed eiders and other avian species during sensitive life history periods, MMS stipulations for operators require that unless it is unsafe to do so, aircraft will avoid flying below an altitude of 1,500 feet over the LBCHU between July 1 and November 15 (the period when molting spectacled eiders are present), and over the spring lead system between April 1 and June 10 (when listed and candidate avian species may be present).

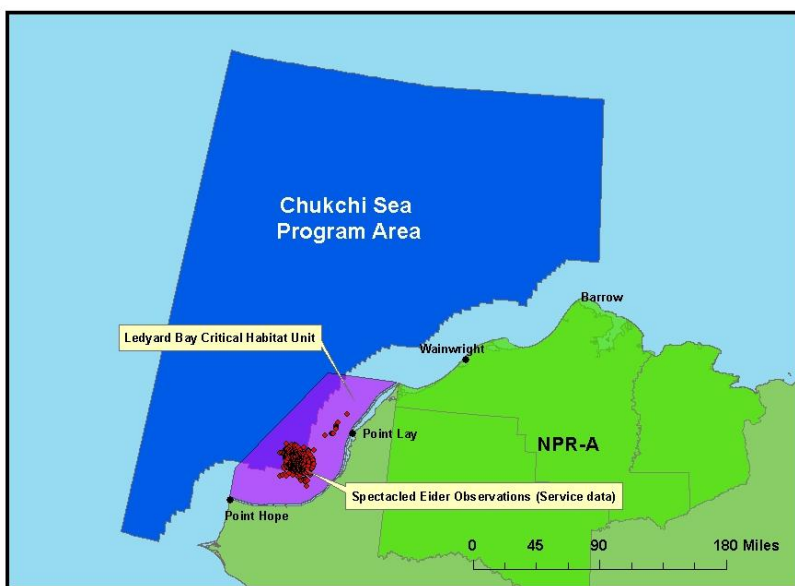
With the low number of anticipated flights and additional protection provided to these avian species through MMS's stipulations, adverse effects to listed eiders or candidate species from aircraft disturbance are not anticipated.

*Vessel transits* – Vessels transiting and operating in an area may displace birds from the immediate area, presumably at some energetic cost to the bird. Seismic surveys are conducted by one or two self-contained vessels that may be accompanied by a guard boat; during

exploratory drilling each drill ship may be supported by two ice breakers and other supply and support vessels.

To prevent impacts to molting spectacled eiders, which are likely energetically stressed and less mobile during this flightless period, MMS will impose stipulations such that no seismic or exploratory drilling vessels may operate in the LBCHU between July 1 and November 15 except for emergencies or human/navigation safety, in which case the incursion must be reported to MMS within 24 hours. The only exceptions are if an exploratory well is to be drilling on one of the few lease blocks in the LBCHU. In this case, which is unlikely to occur given only 36 wells will be drilled in the entire 40.2 million acre Program Area and the small size of the area of overlap between the LBCHU and the Program Area, the drill ship and support vessels are required to enter and exit the LBCHU from the northwest and proceed directly to the drillsite. This should significantly reduce the probability that listed eiders would be encountered, and disturbed by a drill vessels as aerial survey data indicates the portion of the LBCHU though to receive the greatest use by eiders is located east of the Program Area and hence would not be traversed by vessels (see Figure 5.1).

Large numbers of listed and candidate birds are likely present in the Chukchi Sea spring lead system in spring/early summer. Vessels transiting through spring leads may cause short term minor disturbance of these birds, but the effects are limited due to the brief duration of a vessel transit, and the relatively low numbers of vessels that may transit the area. The spring lead system is not within either Program Area, and hence, no exploratory drilling will be conducted within it.



**Figure 5.1 – Location of spectacled eiders observed during aerial surveys in Ledyard Bay (Service data) in relation to the LBCHU boundaries and the Chukchi Sea Program Area.**

Given the relatively low number of vessels (estimated by MMS at 2 drillships and no more than 6 concurrent seismic vessels and their support vessels in each sea, each year) and the stipulations restricting vessel activity in areas where large numbers of listed and candidate species occur (LBCHU and spring lead system), it is unlikely that vessels would encounter these species. A bird that does encounter a seismic or exploratory drilling vessel may be displaced to adjacent undisturbed habitat but is not likely to suffer any measurable adverse effects.

*Seismic acoustic sources* – The effects of seismic surveys are likely similar to those of transiting vessels. Seismic survey vessels move slowly through an area, gradually ramping up acoustic sources during the course of a survey. The sounds generated during seismic work may cause disturbance to listed eiders and candidate species, as these sounds can travel horizontally through the water column. Little is known about avian response to seismic acoustics; however, in a study of long-tailed ducks (*Clangula hyemalis*) in the Beaufort Sea, Lacroix et al. (2003) found no significant difference in numbers of ducks in an area before and after seismic survey work. In some survey areas, long-tailed ducks were observed to dive more frequently than in undisturbed areas, but the cause (vessel versus seismic acoustic source) was unclear.

There is also a temporal separation between avian use of areas and seismic and exploratory drilling activities. Seismic surveys are not permitted in the LBCHU after July 1 when molting spectacled eiders may be present in the critical habitat unit. Timing of spring lead system use by listed eiders can be inferred from king eider satellite telemetry data that indicates males have left the Chukchi Sea and arrived in the Beaufort Sea between April 20 and May 20, while females arrive from May 17-June 8 (Phillips 2005). Similar timing of spring migration of king eiders was noted by Suydam et al. (2000) in their observations at Point Barrow. Based on North Slope tundra arrival dates for Steller's and spectacled eiders (Service, unpublished data), it is likely that Steller's and spectacled eiders show a similar timing of departure from the Chukchi Sea spring lead system as king eiders. Divoky (1984) noted yellow-billed loons appeared to use the spring lead system as a migration pathway. Richardson and Johnson (1981) measured the peak period of abundance of yellow-billed loons migrating past Simpson Lagoon in the Beaufort Sea to be June 3-9, and by mid-June yellow-billed loons are establishing nests on Alaska's North Slope (North 1994). These data suggest breeding yellow-billed loons will also have moved out of the Chukchi Sea by early to mid-June. Seismic surveys cannot commence until the survey area is ice free (early June), so there may only be a few days in which listed eider and yellow-billed loon use may overlap with potential seismic survey activity in spring leads.

Because of natural and stipulated temporal separation of seismic activities and listed eiders and yellow-billed loons the Service does not anticipate adverse effects to listed candidate species from seismic acoustic sources.

*Exploratory drilling* – In addition to vessels transiting to and from exploratory drill sites (discussed above), exploratory drilling may disturb and displace listed and candidate species from the immediate area. However, in the vast majority of the Program Areas listed and candidate species may not be present and hence, not be impacted. Exploratory drilling activities disturb a relatively small area and are stationary, allowing any birds that are present to either habituate to the activities or move away to an undisturbed area.



In areas where large numbers of listed eiders may be present MMS will impose stipulations on operators. MMS will require that seismic surveys, vessel transits, and exploratory drilling do not take place in the spring lead system between April 15 and June 10 to the maximum extent practicable. Although there are some lease blocks in the LBCHU, and it is possible that an exploratory well maybe drilled in LBCHU, it is unlikely. In the unlikely event a well is drilling in the LBCHU MMS will impose stipulations requiring drill rigs and support vessels to enter and exit the area from the northwest to reduce the probability that listed eiders would be encountered. Once at the drill site operations are relatively stationary and do not impact a large area this may allow any spectacled eiders present to either habituate to the activities or move to an undisturbed area. Therefore, adverse effects from disturbance from exploratory drilling are not anticipated.

*Hardwater surveys* – These surveys may take place in the Beaufort Sea during winter. However, these will not adversely affect listed and candidate species through disturbance as these species are absent from the Beaufort Sea in winter.

#### Increased Subsistence Hunting

Prior to the listing of Steller's and spectacled eiders under the ESA, some level of subsistence harvest of these species occurred across the North Slope (Braund et al. 1993). Since listing, the take of listed eiders during subsistence or sport hunting remains illegal but there is evidence that some take is still occurring (USFWS 2009a). The Service has been working with several agencies such as the North Slope Borough and BLM to educate local residents about the protected status of these species, and will continue to do so.

No records were found that suggest either the adults or eggs of Kittlitz's murrelets are used by Alaska Natives for subsistence activities.

On Alaska's North Slope, up to 20 yellow-billed loons that are unintentionally entangled in fishing gill nets may be kept for subsistence use each year. No other harvest is permitted, although there are reports of yellow-billed loons being harvested on the North Slope through shooting (Service data).

No activities proposed during seismic surveys and exploratory drilling would result in an increase in subsistence hunting. The Service anticipates no adverse effects to listed and candidate species from increased subsistence hunting as a result of seismic surveys and exploratory drilling activities.

#### Crude and Refined Oil Spills

Accidental releases of hydrocarbons into the Beaufort and Chukchi seas could result from seismic and exploratory drilling activities. Oil or fuel products entering the environment can have significant impacts on avian species. The biological effects of oil exposure do not differ significantly between oil sources (crude or refined products). Exposure to oil can cause mortality and sublethal effects (Albers 2003). However, because the Arctic marine environment is cold and harsh, health effects on eiders, yellow-billed loons, and Kittlitz's murrelets from low-level exposure are likely to affect their survival and we assume all birds coming into contact with

oil would either be killed outright (direct mortality) or eventually (indirect effects leading to reduced survival).

Exposure to oil affects waterbirds in several ways. Birds that have direct contact with even small amounts of oil or fuel products usually lose the water-proof properties of their feathers and become wet. They then become hypothermic and can drown (Jenssen 1994), particularly in cold environments (Piatt et al. 1990). Bird embryos are highly sensitive to petroleum. Mortality of embryos in incubating eggs and nestlings has been documented by exposure to small amounts of hydrocarbon contamination (light fuel oil, certain crude oil, and weathered oil) transferred by adults with lightly oiled plumage (Parnell et al. 1984; Hoffman 1990; Szaro et al. 1980; and Stubblefield et al. 1995). Birds that ingest hydrocarbon-contaminated food can experience toxicological effects including gastrointestinal irritation, pneumonia, dehydration, red blood cell damage, impaired osmoregulation, immune system suppression, hormonal imbalance, inhibited reproduction, retarded growth, and abnormal parental behavior (Albers 2003; Briggs et al. 1997; Epply 1992; Fowler et al. 1995; Hartung and Hunt 1966; Peakall 1982). Birds can bioaccumulate or biomagnify hydrocarbons and are vulnerable to both direct and sublethal toxic effects from a contaminated food supply (Albers 2003).

Mortality following exposure to oil is common in waterfowl and alcids (the family that includes murrelets), which spend much time in the water and are therefore vulnerable to surface oil (Albers 2003). Clark (1984) found that seabird species most vulnerable to population-level effects of oil pollution include species such as listed eiders, yellow-billed loons, and Kittlitz's murrelet, whose life history characteristics include high adult survival, adaptation to stable and predictable marine environments, and high site fidelity.

The Service has concerns that a spill in the Chukchi or Beaufort Sea has the potential to contact listed and candidate species as well as impact their habitat. However, certain areas are of particular concern because of their importance to large numbers of these birds.

In the Chukchi Sea the spring leads in sea ice along the Alaska coast and LBCHU support large numbers of listed eiders and yellow-billed loons at different times of the year. There is little specific information about spring migration routes for these species, but it is believed the listed eiders advance northward similarly to other species of eiders as spring leads develop in the eastern Chukchi Sea ice. Both spectacled eiders and Steller's eiders occupy Ledyard Bay seasonally during their north and south migrations, although the duration of each species' use is not documented in detail. In spring they presumably move through Ledyard Bay as spring leads open, and in summer and autumn they return utilizing the open waters of Ledyard Bay, with spectacled eiders remaining in the area to molt. Large numbers of molting spectacled eiders are present in Ledyard Bay from late June until late October (Larned et al. 1995, Petersen et al. 1999). Steller's eiders that breed on the North Slope also use Ledyard Bay and nearshore Chukchi Sea water during their southward migration (Martin et al. *in prep.*).

Yellow-billed loons migrate along the Chukchi coast during both spring and fall, generally between 1 and 20 miles from land. Based on satellite telemetry data, total time spent by loons between Point Barrow and Cape Lisburne during migrations was up to 1 month, but less than 2

weeks for most individuals (Schmutz *pers. comm.* 2008). Transitory stops have been documented in Ledyard Bay, Icy Cape, Wainwright, and Peard Bay. Coastal areas near Wainwright were documented for several birds in spring, and the large estuary of Wainwright Inlet and Kuk River was used by several in fall (Schmutz *pers. comm.* 2008).

Kittlitz's murrelets have been recorded as far north as Point Barrow, but are not believed to occur regularly in the Beaufort Sea (USFWS 2007; Piatt et al. 1999). Use of the Beaufort Sea by listed eiders and yellow-billed loons varies over time and by breeding status, and is in part controlled by ice cover on the sea surface (Fischer and Larned 2004, TERA 2002, Schamel 1978). Spring migration of these species appears to take place over a broad front (Richardson and Johnson 1981). In early June runoff water from large rivers such as the Colville forms shoreleads that are used by waterbirds including yellow-billed loons (Richardson and Johnson 1981).

Breeding male spectacled eiders generally depart the terrestrial environment in late June when females begin incubation (Anderson and Cooper 1994, Bart and Earnst 2005). Use of the Beaufort Sea by departing males is variable as indicated by satellite telemetry studies (TERA 2002). Of 14 males implanted with transmitters, only 4 spent an extended period of time (11–30 days), in the Beaufort Sea (TERA 2002). Preferred areas were near large river deltas such as the Colville River where open water is more prevalent. Some appeared to move directly to the Chukchi Sea over land, although the majority moved rapidly (average travel of 1.75 days) over nearshore waters from breeding grounds to the Chukchi Sea (TERA 2002).

Females generally depart the breeding grounds later, when much more of the Beaufort Sea is ice-free, allowing for more extensive use of the area. Females spent an average of 2 weeks in the Beaufort Sea (range 6-30 days) with the western Beaufort Sea the most heavily used (TERA 2002). Females also appeared to migrate through the Beaufort Sea an average of 10 km further offshore than the males (Peterson et al. 1999). This offshore migration route and the greater use of the Beaufort Sea by females is attributed to decreased sea ice later in summer when females migrate through the region (Peterson et al. 1999, TERA 2002).

Yellow-billed loons use nearshore and offshore marine waters adjacent to their breeding areas for foraging in summer. During North Slope aerial surveys for common loons in June, yellow-billed loons were detected in nearshore waters and along barrier islands of the Beaufort Sea (Dau and Larned 2007). While loons are sparsely distributed across their range, at a large scale breeding birds are somewhat clumped in distribution. Based on aerial survey data, breeding concentration areas occur between the Meade and Ikpikpuk Rivers, Colville River Delta, and Teshekpuk Lake (Earnst et al. 2005). Yellow-billed loon migration routes are thought to be primarily marine, within 1-20 miles from land (Schmutz *pers. comm.* 2008). Nineteen yellow-billed loons captured on the ACP between 2002 and 2008 were outfitted with satellite transmitters (Schmutz *pers. comm.* 2008). Although four birds briefly used the Beaufort Sea coast prior to migrating west, most individuals appeared to migrate directly west to the Chukchi coast (Schmutz *pers. comm.* 2008). Most of these birds departed breeding areas in late September, arrived in wintering locations in mid-November, started spring migration in April, and arrived on breeding grounds in the first half of June (Schmutz *pers. comm.* 2008). Non-

breeders or failed nesters may start fall migration in July. Yellow-billed loons migrate singly or in pairs, but gather in polynyas, ice leads, and early-melting areas off river deltas near breeding grounds in spring along the Beaufort Sea coast of Alaska and Canada (Barry et al. 1981; Barry and Barry 1982; Woodby and Divoky 1982; Johnson and Herter, 1989; Barr 1997; Alexander et al. 1997; Mallory and Fontaine 2004). These observations of yellow-billed loons in the Beaufort Sea during migration establish that at least some yellow-billed loons breeding in Canada's Arctic Islands and along the adjacent Canadian coast use this migration route.

To assess probability and potential impacts of oil spills, MMS categorizes spills as small (<1,000 bbl) or large ( $\geq$ 1,000 bbl). MMS conducted a review of spills that have resulted from exploratory drilling on OCS leases from 1971-2007. Of the approximately 14,000 wells drilled, 4 resulted in spills of crude oil or condensate reaching the environment with spill sizes ranging from 0.8 bbl to 200 bbl (MMS 2008). Therefore, MMS estimates the chance of a large ( $\geq$ 1,000 bbl) oil spill from exploratory activities is very low, and impacts from a large spill resulting from activities in the first incremental step (seismic surveys and exploratory drilling) were not considered in this BO.

While spills of crude oil are not reasonably foreseeable, small spills of refined oil products are likely to result from seismic and exploratory drilling activities. In the Beaufort and Chukchi OCS region, 35 exploratory wells have been drilled. During these activities a total of 35 small spills occurred, with spill volumes totaling 26.7 bbl (1,120 gallons). Of the 26.7 bbl spilled, approximately 24 bbl (90%) were recovered or cleaned up (MMS 2008). The volume of spills ranged from 0.01 gallons to 800 gallons, with a median spill size of 1 gallon. The majority of small spills are into containment and do not reach the environment, while others are onto platforms and facilities and can be easily cleaned up (MMS 2008). MMS anticipates a similar pattern of low numbers of small spills of diesel, refined fuel, or crude oil will occur as a result of seismic and exploratory drilling activities.

Because spills are low volume and have a high recovery rate, and the density of listed eiders and candidate species in most areas is very low, even if a spill reaches the environment there is a correspondingly low likelihood these species would be affected by small spills in the marine environment during seismic surveys and exploratory drilling.

#### Toxic Contamination

Toxics contamination from oil extraction activities can result from oil spills (addressed above) and from disposal of drilling muds and cuttings. Discharge of drilling muds (used to lubricate drill bits), cuttings (material removed from drill holes), and other materials to the marine environment is regulated by the Environmental Protection Agency (EPA). In June 2006 the EPA issued a National Pollution Discharge Elimination System (NPDES) permit for oil and gas exploration facilities on the OCS and contiguous State waters. This permit places limits on the location, volume, and materials that can be discharged to marine waters from exploratory drilling activities.

In their DEIS, MMS (2008) notes that changes in species composition, abundance, or biomass of the benthic biota resulting from the release of synthetic-based mud cuttings generally were

detected at distances of 50 m – 500 m from well sites. These biological effects can be attributed to chemical toxicity of discharges, organic enrichment, and deposition of fine particles in drilling wastes. While the recovery of benthic communities was generally documented to occur within 1 year of completion, a study documented a decrease in benthic invertebrate richness and abundance at a distance of 50 m 2 years after exploratory drilling stopped (MMS 2008).

Given the relatively small impact area from structures associated with exploratory drilling in relation to the size of the Program Areas, the low number of wells that are likely to be drilled in the area (MMS estimates a maximum of 36 for the Chukchi Sea and 34 for the Beaufort Sea Program Area over 12 years), and the limits on the discharges enforced through the NPDES permit process, the Service does not anticipate adverse effects to listed eiders, yellow-billed loons, or Kittlitz's murrelets from toxic contamination resulting from discharges of drilling mud and cuttings.

### Collisions

Migratory birds suffer substantial mortality from collisions with man-made structures (Manville 2004). Birds are particularly at risk of collision with objects in their path when visibility is impaired during darkness or inclement weather, such as rain, drizzle, or fog (Weir 1976). In a study of avian interactions with offshore oil platforms in the Gulf of Mexico, Russell (2005) found collision events were more common, and more severe (by number of birds) during poor weather. Certain types of lights (such as steady-state red) on structures increase collision risk (Reed et al. 1985, Russell 2005, numerous authors cited by Manville 2000). This is particularly apparent in poor weather when migrating birds appeared to get into circulation patterns around structures after being attracted to lights and becoming unable to escape the “cone of light” (Russell 2005, Gauthreaux & Belser 2002, Federal Communications Commission 2004).

Flight behavior over water of the listed eiders and candidate species places them at risk of colliding with human-built structures. Day et al. (2005) suggested that eider species may be particularly susceptible to collisions with offshore structures as they fly low and at relatively high speed (~ 45 mph) over water. Johnson and Richardson (1982), in their study of migratory behavior along the Beaufort Sea coast, reported that 88% of eiders flew below an altitude of 10 m and >50 % flew below 5 m. Kittlitz's murrelets also fly low and fast (>2 m above the water surface, average 94 km/hr) (Day et al. 1999). Their flight was described as having a long and sweeping pattern, which renders them unable to change direction quickly (Kishchinski 1968 cited by Day et al. 1999), further increasing their risk of collision. Yellow-billed loon flight has been recorded at 64 km/h (Dixon 1916 cited by North 1994) and they fly low over water (Bailey 1948 cited by North 1994).

Depending upon location and timing of operations, vessels and exploration structures pose a collision risk for Steller's and spectacled eiders and yellow-billed loons migrating to and from Alaska's North Slope. Kittlitz's murrelets may also be at risk for collisions from structures. In an effort to reduce collision risks resulting from bird attraction to lighted structures, MMS will require that vessels minimize the use of high-intensity work lights, especially within the 20-m bathymetric contour. Exterior lights will only be used as necessary to illuminate active, on-deck work areas during periods of darkness or inclement weather; otherwise they will be turned off.

Interior and navigation lights will remain on for safety. Lessees are also required to implement lighting protocols aimed at minimizing the radiation of light outward from exploratory drilling structures.

Despite these stipulations, the Service concludes that there may be adverse effects to listed eiders, yellow-billed loons, and Kittlitz's murrelets from collisions. Our estimate of the magnitude of this threat is presented in Section 8.0 - *Incidental Take Statement*.

#### Increased Predation

No activities proposed during seismic surveys and exploratory drilling are anticipated to result in an increase in predators of either listed or candidate avian species. Therefore, no adverse effects from increased predation are anticipated.

### **5.2.2 Ledyard Bay Critical Habitat Unit**

The LBCHU was designated to protect the habitat of molting spectacled eiders, particularly from the North Slope breeding population. The primary constituent elements of the unit are: marine waters > 5m and ≤ 25 m in depth; associated marine aquatic flora and fauna in the water column; and the underlying marine benthic community.

A portion of the LBCHU overlaps with the Chukchi Sea Program Area, and only a subset of this area has recorded observations of molting spectacled eiders (Figure 5.1). Molting spectacled eiders in LBCHU depend on the marine benthic community to meet their high nutritional requirements during the energetically demanding molt period. Feder et al. (1989, 1994a, 1994b) found a different substrate (muddy-gravel) and invertebrate community in the western LBCHU than sites sampled further east. This information suggests the western portion of LBCHU, the area which overlaps with the Chukchi Sea Program Area, is less favorable for molting spectacled eiders than the central and eastern LBCHU.

None of the activities that may result from the first incremental step of the Action will impact the primary constituent element of water depth in the LBCHU. However, as described above drilling muds and cuttings may be discharged during exploratory drilling, an activity that is regulated by the EPA. These discharges can result in the deposition of sediment may affect the biota of the immediate area through toxicity, or organic enrichment. However, these effects are localized and have been detected in an area up to 500 m from well sites, and are short lived as recovery of benthic communities was documented within 1 year of the completion of the activity (MMS 2008). Given the relatively small impact area from exploratory drilling discharges and their short-lived nature significant adverse effects to the primary constituent elements of the critical habitat unit are not anticipated, and they should not appreciably reduce the conservation value of the LBCHU for spectacled eiders.

Further, there is a low likelihood that any exploratory wells would be drilled in the LBCHU. MMS estimates a maximum of 38 wells may be drilled over 12 years for the entire 40.2 million acre Chukchi Sea Program Area.

As described above, large oil spills are not anticipated to result from seismic surveys and exploratory drilling activities. However, it is likely that small spills of refined oil products will occur. Due to the high recovery rates of low-volume spills, and the low probability of occurrence of large spills, the Service concludes that while possible, adverse effects to critical habitat from oil spills are very unlikely to result from seismic surveys and exploratory drilling activities.

### **5.2.3 Polar Bears**

#### Habitat Loss

Under the first incremental step no permanent structures would be constructed. Capped subsea exploratory wells may remain in place, but polar bears do not use the sea floor. Therefore, no impacts to polar bears from habitat loss will result from the first incremental step of leasing and exploration.

#### Physical Obstructions

While it is possible polar bears may encounter drill rigs, it is unlikely the presence of drill rigs would obstruct a polar bear. The bears are extremely mobile and will likely modify their route to avoid the facility, as discussed below in the disturbance section.

#### Disturbance and Displacement

*Aircraft* - Polar bears are known to run from sources of noise and the sight of aircraft, especially helicopters. The effects of fleeing from aircraft may be minimal if the event is short and the animal is otherwise unstressed, but a polar bear may overheat during warm weather.

Low numbers of aircraft operations are anticipated during seismic surveys and exploratory drilling activities. Each seismic survey operation may generate < 1 helicopter flight/day to and from a shore facility such as Barrow or Deadhorse. This could rise to 1-3 helicopter flights/day during exploratory drilling. MMS anticipates a maximum of two drilling operations in each Program Area each year, and up to seven seismic surveys between the two Program Areas. Therefore, given the low number of operations and the size of the Program Areas, the number of potential helicopter overflights an individual polar bear may experience is extremely low. These occasional overflights should have little to no effect on polar bears, although they may elicit short-term behavioral changes.

Fixed-wing aircraft operations during seismic surveys and exploratory drilling operations would likely be limited to marine mammal observation flights which take place at an altitude of 1,500 feet. Flights at this altitude are not anticipated to result in behavioral response or adverse effects to polar bears.

*Vessel Transits* - Ships and ice breakers may act as physical obstructions, altering or intercepting bear movements, and polar bears have been documented moving away from vessels. MMS anticipates a maximum of 2 drilling operations and up to 6 seismic survey operations may be conducted in each sea, each year. Seismic surveys would be conducted by one or two seismic ships that may be accompanied by a guard boat. Exploratory drilling vessels are often

accompanied by several ice breakers, supply ships, tugs, and other support vessels. MMS estimates each exploratory well could take 30-90 days to drill (MMS 2008). Hence, exploratory drilling activities are relatively constant in space for long periods of time. This may allow polar bears to avoid the activities.

Previous seismic and exploratory drilling operations in the Beaufort and Chukchi seas have been authorized under the Marine Mammal Protection Act (MMPA) through the issuance of ITRs and LOAs. The LOAs require a number of mitigation measures, including the use of marine mammal observers on vessels conducting seismic and exploratory drilling activities. Observers ensure vessels remain at least ½ mile from polar bears observed on land or ice and provide the observation data to the Service. This data provides an indication of the level of impacts that may result from future seismic surveys and exploratory drilling activities.

Previous marine studies suggest the number of polar bears observed is low and disturbance by industrial projects is minimal. Five polar bear observations (11 individuals) were recorded during the University of Texas at Austin's marine geophysical survey in the northern Chukchi Sea and Arctic Ocean performed by the U.S. Coast Guard (USCG) Cutter *Healy* in 2006. All bears were observed on the ice between July 21 and August 19. Four of the groups exhibited possible reactions to the helicopter or vessel, suggesting that disturbance from vessels may cause changes in behavior.

Marine mammal observers were on watch for 9,745 km of seismic survey and shallow hazard and site clearance lines surveyed by Shell Offshore Inc. in the Chukchi Sea in 2008 and no polar bears were observed by either the seismic vessel or its support vessels. During a similar project, observations along 14,709 km of lines in the Beaufort Sea offshore from Harrison and Camden Bay took place in 2008 and no polar bears were observed during the open water seismic survey portion of the project. However, 6 polar bear sightings were made during shallow hazards and site clearance activities. The difference in the number of observations between seismic surveys and shallow hazard surveys is likely related to survey location. Seismic surveys occur in open waters, away from ice concentrations while shallow hazard surveys are close to shore and the majority of the bears observed were near barrier islands. The marine mammal observers reported 50% of polar bears observed did not respond to vessel presence, while 50% looked at the vessel. One polar bear swam towards the vessel and the seismic air gun array was shut down to prevent possible effects from noise.

In 2006, 3 seismic surveys were conducted at different times in the Chukchi Sea, with a total survey line length of 26,029 km (Ireland et al. 2009). Four polar bears were observed on these surveys, 3 of which responded to the vessels by moving away. The polar bears were closely associated with ice and were observed by vessels transiting to the survey areas and not during the surveys which occurred in relatively ice-free areas. Four polar bears were also observed in the Beaufort Sea in 2006 by vessels involved with shallow hazard and site clearance seismic surveys. Of these one was feeding and did not alter its behavior, two (a mother and cub) entered the water in response to the vessel, and one was observed already swimming (Funk et al. 2006).



These data suggest that few bears are likely to encounter seismic survey and exploratory drilling vessels in the Program Areas, and those that do may not react to them. Any adverse effects that do occur are likely to be limited to temporary, minor, behavioral disturbance to a small number of polar bears. These limited impacts from previous activities were subject to mitigation measures applied through the Beaufort and Chukchi Sea ITRs and LOAs. It is likely that subsequent activities that may result from the first incremental step of the Action would require authorization under the MMPA when it is likely similar mitigation measures would be stipulated, further reducing potential impacts.

*Seismic Acoustic Noise* - As polar bears normally swim with their heads above the surface, where underwater noises are weak or undetectable, it is unlikely these noises would cause auditory impairment or other physical effects. Noise produced by seismic activities could elicit several different responses in polar bears. It may act as a deterrent to bears entering the area of operation, or attract curious bears. However, there is no evidence that airgun pulses can cause serious injury, or death, even in the case of large airgun arrays. The Beaufort and Chukchi Sea ITRs issued under the MMPA require mitigation measures for seismic survey operations in the Beaufort and Chukchi seas. Marine Mammal Observers are required on seismic vessels, and they are responsible for instructing the vessel's captain to power-down or shut-down airgun arrays if polar bears enter the 190 db ensonification zone. This mitigation significantly reduces the likelihood that adverse effects might occur. These, or similar, mitigation measures will likely be required for future seismic survey work in the Program Areas as a stipulation of MMPA authorization.

The Beaufort and Chukchi Sea ITRs also require Industry to report all polar bear observations to the Service. While polar bears were observed by vessels travelling to the survey areas no polar bears were observed during active seismic surveys conducted in the Beaufort and Chukchi seas in 2006 (Funk et al. 2006) and 2008 (Ireland et al. 2009). This was ascribed to the close association of polar bears with ice, and the avoidance of ice by seismic surveys.

Given the low number of seismic surveys likely to occur, and the tendency for seismic surveys to avoid areas and periods of heavy sea ice, and polar bear swimming behavior, the Service concludes that it is unlikely that a polar bear would be exposed to strong underwater seismic sounds long enough for significant impacts to occur. Our confidence in this conclusion is further enhanced by the mitigation measures currently required under the Beaufort and Chukchi Sea ITRs, and that would likely be required by future MMPA authorization, as activities are not permitted to produce more than a negligible impact to a stock.

#### *Exploratory Drilling*

Noise produced by exploratory drilling activities could elicit several different responses in polar bears. The noise may deter bears from entering the area or potentially attract bears. Attracting bears to these facilities could result in human–bear encounters (see Human-Polar Bear Interactions, below).

Some information is available from monitoring polar bears during previous offshore drilling operations. In 1990, in conjunction with the Shell Western E&P, Inc. walrus monitoring

program, 25 polar bears were observed on the pack ice between June 29, and August 11, 1990. Seventeen bears were encountered by the support vessel, *Robert LeMeur*, during an ice reconnaissance survey before drilling began. During drilling operations, four bears were observed near (< 9 km) active prospects, while the remainder were 15-40 km away. These bears responded to the drilling or icebreaking operations by approaching (two bears), watching (nine bears), slowly moving away (seven bears), or ignoring (five bears) the activities; response was not evaluated for two bears. The period of exposure to the operations was generally short because precautions were taken to minimize disturbances, including adjusting cruise courses away from bears. Similar precautions were followed in 1989 when 18 bears were sighted in the pack ice during the monitoring program.

Summer sea ice extent in the Chukchi Sea has decreased considerably between 1990 and the present. Polar bears in this area are closely associated with ice, and are known to shift their distribution following the northward contraction of sea ice in summer (Garner et al. 1990). The extent of sea ice in the Chukchi and Beaufort seas, has changed significantly in recent years, therefore data collected during exploratory drilling operations in 1990 may not indicate how many polar bears may encounter future exploratory drilling operations in the Program Areas.

Given the low number of drilling operations (the maximum number predicted by MMS is two operations in each Program Area), and the sparse distribution of polar bears in the area, the Service concludes disturbance from exploratory drilling will likely cause at most behavioral changes such as avoidance of the immediate project area, of low numbers of polar bears.

#### *Hardwater Surveys*

As described in Section 2 – *Proposed Action*, it is also possible hardwater surveys may occur on landfast ice in the Beaufort Sea between January and May. Noise and vibrations from these activities have the potential to disturb mobile or denning polar bears in the area.

Prior to the onset of hardwater surveys, MMS will require operators obtain authorization for their activities under the MMPA. Previously these authorizations have required operators to conduct polar bear den searches. If a den is located, activities will be modified where necessary to provide a 1 mile or more radius, as determined by the Service's MMM office, buffer around a den site, in an attempt to prevent disturbance impacts to denning polar bears. These types of stipulations will likely be required for future hardwater survey operations. It is possible mobile bears could encounter and be disturbed by these activities. This may result in a minor change in the bear's behavior, most likely to avoid the survey area, or possibly result in human-polar bear interactions as described below.

#### Human-Polar Bear Interactions

Human encounters can be dangerous for both the polar bear and the human. Whenever humans work in the habitat of the animal, there is a chance of an encounter, even though, historically, such encounters with Industry have been uncommon. Depending upon the circumstances, bears can be either repelled from or attracted to sounds, smells, or sights associated with Industry activities.

Seismic and exploratory activities that may result from the Action could increase the total number of human-polar bear interactions that occur in the Action Area. However, as described above, there will be few surveys and drilling operations, limiting the numbers of polar bears likely to encounter these operations. Further, industry activities are subject to the prohibitions of the MMPA, which prohibit the taking of polar bears without authorization. Historically, to prevent human-polar bear interactions that may lead to the injury or killing of a bear in defense of human life, Industry has requested and received authorization to deter polar bears away from facilities. While deterring a polar bear will affect its short-term behavior, it is unlikely to significantly reduce the animal's survival.

Based upon the demonstrated effectiveness of the mitigation measures required by the ITRs and LOAs and used by Industry to date, and the low number of surveys that may occur in the Program Areas, the Service anticipates that Industry exploration activities will result in only low numbers of short term behavioral changes as a result of these non-lethal human-polar bear interactions.

#### Crude and Refined Oil Spills

Polar bears could be exposed to petroleum hydrocarbons through direct contact with spills in the marine environment, or by ingesting contaminated prey (Neff 1990). Polar bears groom themselves regularly as a means of maintaining the insulating properties of their fur, so oil ingestion would also be likely during grooming by a fouled bear (Neff 1990). Some direct information on oiled polar bears comes from an experimental study (St. Aubin 1990) in which two polar bears were involuntarily forced into a pool of oil for 15 minutes and then observed. The animals immediately attempted to clean the oil from their paws and forelegs by licking, and continued grooming trying to clean their fur for five days. After 26 days one bear died of liver and kidney failure and the other bear was euthanized at day 29. Gastrointestinal fungus-containing ulcers, degenerated kidney tubules, low-grade liver lesions, and depressed lymphoid activity were found during necropsy (St. Aubin 1990). Other effects included loss of hair (Derocher and Stirling 1991), anemia, anorexia, and stress (St. Aubin 1990).

Additionally, polar bears are curious and may investigate oil spills or oil-contaminated wildlife. Although it is not known whether healthy polar bears in their natural environment would avoid oil spills and contaminated seals, bears that are hungry are likely to scavenge contaminated seals, as they have shown no aversion to eating and ingesting oil (St. Aubin 1990, Derocher and Stirling 1991).

As described above for listed eiders, MMS considers it extremely unlikely a large spill of crude oil would occur during seismic survey and exploratory drilling activities. However, small spills are likely to result from these activities. Spills from seismic surveys and exploratory drilling activities on Alaska's North Slope and offshore area have ranged in size from 0.01 gallons to 800 gallons with a median spill size of 1 gallon. Approximately 90% of the oil spilled during exploratory drilling operations in the Beaufort and Chukchi Sea OCS region was recovered or cleaned up (MMS 2008). The majority of small spills are into containment and do not reach the environment, while others are onto platforms and facilities and can be easily cleaned up (MMS

2008). MMS anticipates a similar pattern of low numbers of small spills of diesel and refined fuels will occur as a result of seismic surveys and exploratory activities.

If a polar bear were to contact spilled oil, it could die. However, because expected spills are low volume and have a high recovery rate (MMS 2009), and the density of polar bears in the Beaufort and Chukchi Sea Program Areas is low, even if a spill reaches the environment there is a correspondingly low likelihood polar bears would be affected by small spills in the marine environment during seismic surveys and exploration activities. Further, there is likely a spatial separation between seismic surveys and exploratory drilling and the species as polar bears generally move offshore with retreating pack ice while seismic surveys and exploratory drilling activities usually take place in relatively ice-free areas. In addition, in the event of oil reaching the environment, it is also likely that polar bears would be intentionally deterred to keep them away from the area, further reducing the likelihood of bears contacting the oil. The Service concludes any impacts associated with small oil or refined product spills are likely to be limited to a small number of polar bears, although death of individual bears is possible if oil contacts them.

#### Toxic Contamination

Industrial activity in polar bear habitat may expose individuals to other hazardous substances through improper storage or spills. The impacts of spills are discussed above.

Seismic survey operations do not result in the discharge of toxic or hazardous substances. Exploratory well drilling, with authorization from the EPA, could result in the discharge of drill mud and cuttings, although given the low number of wells estimated to be drilled in the Program Areas (MMS estimates a maximum of 36 in the Chukchi Sea Program Area and 34 in the Beaufort Sea Program Area over 12 years), we do not believe that such discharges would be substantial. If the discharge of drill mud and cuttings does occur the biotic communities in the immediate area (a 500 m radius around the point of discharge) could be affected, although only for a short period of time (< 1 year) (MMS 2008). Polar bears are unlikely to be exposed to the very localized impacts that may result from the discharge of drill mud and cuttings, as polar bears have very large ranges and move considerable distances each year as do their prey species. For example, Beaufort Sea females movement ranged from 3,415 km to 6,200 km (Amstrup et al. 2000b), while Chukchi Sea females moved on average 5,542 km / year (Garner et al. 1990).

Given the relatively small impact of area of the discharges of drill mud and cuttings from exploratory well drilling, the low number of wells expected to be drilled, the rapid recovery rate of biota in a discharge area, and the broad area traveled by a polar bears, adverse impacts are not anticipated from toxic contamination resulting from seismic surveys and exploratory drilling activities.

#### Impacts to Prey Species

Ringed seals are the primary prey of polar bears and inhabit the nearshore waters of the Action Area. Seals may be adversely affected through contamination such as oil spills and noise disturbance from industrial activities. Studies have shown that seals can be displaced from certain areas, such as pupping lairs or haulouts, and abandon breathing holes near oil and gas

industry activity (Kelly et al. 1988). However, significant effects to these species from existing oil development activities in the Beaufort Sea have not been documented (Moulton et al. 2003 cited by MMS 2008), it is not likely that seismic survey and exploratory drilling activities will have significant impacts to seal species that would result in adverse effects to polar bears.

**Table 5.1 – Summary of impacts that may occur from activities authorized in the first incremental step of the section 7 consultation for each listed and candidate species and the LBCHU.**

	Steller's Eider	Spectacled Eider	Polar Bear	Kittlitz's murrelet	Yellow-billed loon	LBCHU
Habitat Loss	X	X	X	X	X	X
Disturbance	X	X	Adverse Effect	X	X	n/a
Increased subsistence harvest	X	X	X	X	X	n/a
Oil spills	Adverse Effect	Adverse Effect	Adverse Effect	Adverse Effect	Adverse Effect	Adverse Effect
Toxic contamination	X	X	X	X	x	X
Collision	Adverse Effect	Adverse Effect	n/a	Adverse Effect	Adverse Effect	n/a
Increased predation	X	X	X	X	x	n/a
Physical obstruction	n/a	n/a	X	n/a	n/a	n/a
Human-polar bear interactions	n/a	n/a	Adverse Effect	n/a	n/a	n/a
Impacts to prey species	n/a	n/a	X	n/a	n/a	n/a

x = No adverse effect; n/a = not applicable.

### 5.3 Development Scenarios

In addition to assessing the impacts of activities that may result from the first incremental step of seismic surveys and exploratory drilling, the impact of subsequent development activities was also assessed.

There is considerable uncertainty as to the location, amount, and type of additional development, if any that may occur under the Action. However, as described in Section 2 – *Description of the Proposed Action*, MMS has developed reasonable development scenarios (DS) for each Program Area. These DSs were used to provide an estimate of potential impacts to listed species if development were to occur as described. Activities associated with any development and production, if in fact it does occur, would take place in marine and terrestrial environments, and could include construction of permanent facilities (central production facility, satellite facilities, subsea and terrestrial pipelines, pump stations) and associated aircraft and vessel traffic; operation of those facilities over the life of the field; and removal and/or abandonment in place of facilities.

### 5.3.1 Avian Species and LBCHU

#### Habitat Loss

If development occurs, MMS anticipates construction of one central platform with several satellite wells connected via subsea pipelines in one or both of the Program Areas. These facilities would impact a small area of the sea floor, with some structures above the water surface. Given the large size of the Program Areas (approximately 33.2 million acres for the Beaufort Sea Program Area and 40.2 million acres for the Chukchi Sea Program Area) significant impacts from permanent habitat loss in the marine environment are not anticipated. However, if facilities were located within the LBCHU, spring leads, or other areas used by large numbers or a high proportion of the populations of listed and candidate species, adverse effects could occur.

In the terrestrial environment, direct loss of habitat could occur by placement of gravel fill onto the tundra or by excavation of materials at mine sites. If development occurs in the Chukchi Sea Program Area, MMS anticipates construction of a new shorebase on the coast between Icy Cape and Point Belcher with oil/gas pipeline(s), communications lines, and a road stretching from the shorebase approximately 300 miles to link with the TAPS. MMS estimates an additional staging area, and 4 pump stations would also be constructed along the route. The total footprint of these facilities is estimated as 17.37km<sup>2</sup>.

MMS anticipates any further development in the Beaufort Sea Program Area would likely use existing infrastructure. Development in the central Beaufort Sea would likely make use of existing oil development facilities at Milne Point, Northstar, or Endicott. In the western Beaufort Sea, the Cape Simpson site would likely serve as a shore base with road and pipeline and communications constructed through NPR-A to the Kuparuk oilfield to link with TAPS. In the eastern Beaufort Sea MMS anticipates Point Thompson would be the most likely location for a shorebase, although use of this site would likely require construction of an airstrip. The amount of terrestrial habitat that could be impacted by a new development project in the Beaufort Sea Planning Area would vary depending on location but is estimated to be  $\leq 3.45 \text{ km}^2$  (MMS 2009).

The location of development would determine the effects of breeding habitat loss on listed eiders, because density varies considerably across the North Slope. Assuming the gradient in observed density reflects a gradient in habitat quality, and displacing birds from preferred habitat reduces their reproductive potential, placing fill in areas used by nesting eiders may compromise their reproductive potential. To estimate the number of pairs affected, the footprint size can be multiplied by the density of birds. If the infrastructure and associated fill were placed in areas of average spectacled eider density (0.223 birds/km<sup>2</sup>; calculated for 2002-2006; Larned et al. 2003, 2005a, 2005b, 2006), a few pairs would be affected each year. However, given the variation in density (<0.034 to 1.248 birds/km<sup>2</sup>), the total number of pairs potentially affected ranges from <1 to over 12 pairs/year, depending on the location of facilities.

Impacts of terrestrial habitat loss on Steller's eiders are even more dependent on location. Aerial surveys optimized to detect eiders since 1992 (Larned et al. 2006) indicate Steller's eiders occur at very low densities across the ACP, with highest density in the vicinity of Barrow. The

average density of Steller's eiders observed during ACP surveys in 2002-2006 was 0.0045 birds/km<sup>2</sup> (Larned et al. 2003, 2005a, 2005b, 2006), but near Barrow was 0.63 birds/km<sup>2</sup> (Rojek 2008). Thus, the proportion of the breeding population affected varies significantly depending on how much habitat loss occurs near Barrow. While development activities, such as construction of a shorebase, are not anticipated to occur at Barrow, if such an activity were proposed significant impacts to Steller's eiders could result.

Yellow-billed loons are patchily distributed across the ACP due to narrow breeding habitat requirements; thus, impacts of terrestrial habitat loss also depend on location. Based on fixed-wing aerial survey data (1992 to 2003 ACP and North Slope Eider (NSE) surveys conducted by the Service), Earnst et al. (2005, p. 300) calculated that most of the population on the ACP of Alaska occurred within concentration areas with more than 0.11 individuals per square kilometer (km<sup>2</sup>). Such areas comprised only 12 percent of the surveyed area yet contained 53 percent of yellow-billed loon sightings. The largest concentration area was between the Meade and Ikpikpuk Rivers and other notable concentrations were on the Colville River Delta and west, southwest, and east of Teshekpuk Lake (Earnst et al. 2005). Estimates of average density on the Colville River Delta has varied from 0.13-0.17 birds/km<sup>2</sup> (Johnson et al. 2005, 2006, 2007), while in the larger area of the Northeast Planning Area of the NPR-A density was estimated to be lower, 0.07 birds/km<sup>2</sup> (Johnson et al. 2005). Infrastructure and associated fill may affect a few pairs of yellow-billed loons per year, particularly if development occurs in loon concentration areas. However, if development occurs in the NPR-A, disturbance will likely be mitigated by required operating procedures for oil and gas which requires aerial surveys prior to development of oil and gas facilities. These facilities must then be designed and located to minimize impacts to nesting yellow-billed loons. The default mitigation is avoiding placement of facilities within 1-mile of a nest and 500 m around the remaining lake shoreline (BLM 2004, 2008).

The terrestrial portion of the Action Area is on the northern edge of the breeding range for Kittlitz's murrelets. This species nests near the coast in steep, rocky habitat on the Chukchi coastline, which is presumably unsuitable for a pipeline landfall and associated infrastructure. It also seems likely that a road and pipeline Right Of Way (ROW) connecting Chukchi Sea development facilities to the TAPS would run predominantly east-west, nearly perpendicular to the Chukchi Sea coast, which would reduce the amount of possible infrastructure within Kittlitz's murrelet habitat. Kittlitz's murrelet nesting has not been recorded on the Beaufort Sea coastline. Given these factors, we conclude that little Kittlitz's murrelet breeding habitat loss would result from further development.

#### Disturbance and Displacement

As noted in our analysis of the effects of the first incremental step, the severity of disturbance and displacement effects depends upon the duration, frequency, and timing of the disturbing activity; these would likely increase with development and production.

Vessels (barges and support vessels) and aircraft (both fixed-wing and helicopters) could transport materials and personnel to both onshore and offshore facilities during all phases of a development project. The number and frequency of vessel and aircraft operations would likely be significantly higher per year in the construction phase of a project than in the production

phase. The effects of vessel and aircraft disturbance on listed eiders and candidate species may include escape response behavior at some energetic cost to individual birds. Depending upon the frequency of operations and routes traversed by vessels and aircraft, impacts could range from negligible (few listed and candidate birds encountered at irregular intervals) to substantial (for example, vessels or aircraft repeatedly encounter large molting flocks of spectacled eiders in the LBCHU).

In the terrestrial environment, human activities such as the movement of personnel and equipment at the shore base, storage pads, along the access road and pipeline ROW could result in the repeated disturbance of listed eiders and yellow-billed loons. If disturbance were to occur during the nesting period it could adversely affect individuals by: 1) flushing females from nests or shelter in brood-rearing habitats, exposing eggs or ducklings to inclement weather and predators; and 2) displacing adults and or broods from preferred habitats during pre-nesting, nesting, and brood rearing, leading to reduced foraging efficiency and higher energetic costs. Based upon calculations by MMS, total habitat loss due to disturbance near infrastructure could total 33.55km<sup>2</sup> for development in the Beaufort Sea Program Area and 197 km<sup>2</sup> in the Chukchi Sea Program Area (MMS 2008).

The individual tolerance and behavioral response (i.e., habituation) of these species to disturbance likely varies. There doesn't appear to be a clear relationship between the movements of spectacled eiders and oil infrastructure (Troy 1995), but it is possible that females could choose to avoid nesting in habitats near repeated human activities (essentially, habitat loss). If this occurred in areas supporting high densities of listed eiders, such as near Barrow, the resulting disturbance during the nesting season could lead to significant impacts to the species. It is difficult to estimate how much habitat would be rendered less suitable for nesting as a result of disturbance, but the Service typically assumes that nesting behavior may be disrupted by human activities within 200 m of nests (USFWS 2008c). If so, the potential for the habitat to support nesting would be compromised.

Loons as a genus are susceptible to disturbance, although they sometimes habituate to predictable disturbance (Vogel 1995; Barr 1997; Evers 2004; Earnst 2004; Mills and Andres 2004; North 1994). As described above, disturbance from development activities in NPR-A, where a large proportion of high-density yellow-billed loon nesting habitat occurs, will likely be mitigated by BLM's required operating procedures.

#### Increased Subsistence Hunting

Prior to the listing of Steller's and spectacled eiders under the ESA, some level of subsistence harvest of these species occurred across the North Slope (Braund et al. 1993). Killing continues despite prohibitions against taking spectacled and Steller's eiders. MMS's Chukchi DS includes a new road into previously undeveloped areas, which could provide access to previously inaccessible areas for hunters. The Service will continue to work with local communities to ensure that hunters are aware of prohibitions on hunting listed eiders and restrictions on yellow-billed loon harvest, and the recent increase in Service law enforcement on the North Slope aims to minimize additional impacts from hunting. Development is not anticipated to result in an increase in the subsistence harvest these species.



### Crude and Refined Oil Spills

The effects of oil on birds were discussed under the incremental step (seismic surveys and exploratory drilling) analysis; based on these effects and the harsh arctic environment, we assumed that if oil contacts a listed or candidate bird the bird will die. MMS anticipates that if the DS occur, small spills of crude and refined oil products would occur, and one or more large spills may also result.

*Small Spills* – MMS estimates if development were to occur in the Chukchi Sea as described in the DS, 178 spills of crude oil with an average size of 3 bbl could occur over the 25 year production life along with an additional 440 refined oil spills with an average volume of 0.7 bbl. Additional development in the Beaufort Sea Program Area could result in 89 crude oil spills with an average size of 3 bbl and 220 refined oil spills with an average volume of 0.7 bbl over the 20 year production life (MMS 2008).

However, as described above, these spills are of low volume and have a high recovery rate. In addition, the density of listed eiders and candidate species in most of the Program Areas is very low, so even if a small spill reaches the environment there is a correspondingly low likelihood that oil would contact individuals of these species.

*Large Spills* - Our greatest concern for impacts of oil and gas development to listed and candidate species and critical habitat are large marine oil spills. If development occurs as described in the DS, MMS considers there is a 26% probability of one or more large spills occurring in the Beaufort Sea Program Area over the 20-year production life, and a 40% probability of one or more large spills occurring in the Chukchi Sea Program Area over its 25-year production life (MMS 2008).

The impact of a large spill on listed species will depend upon the location of spilled oil in relation to the distribution of listed and candidate birds and important habitats, including the LBCHU. While listed eiders are present in the Beaufort Sea, and tens of individuals could be killed by a spill in the Beaufort Sea, the greatest concentrations of these species, and hence, the areas of greatest concern are in the Chukchi Sea. MMS modeled oil spill behavior and calculated the conditional probability of a large spill from a range of possible launch areas in each Program Area reaching different environmental resource areas (ERAs) (MMS 2008). ERAs represent areas of social, economic, and biological resources including the LBCHU and the Chukchi Sea spring lead system.

MMS oil spill trajectory modeling indicates that oil from a large summer oil spill from the Beaufort Sea Program Area has only a  $\leq 0.5\%$  to 1% probability of reaching the spring leads after 360 days. In 31 of the 42 launch areas and pipeline segments modeled oil had a  $\leq 3\%$  probability of encountering the spring leads, oil from 9 of the 42 launch areas pipeline segments had a  $\leq 9\%$  probability of reaching the spring lead system, while oil from the remaining launch area and pipeline segment had a 15% and 12% probability respectively, of reaching the spring lead system after 360 days. Oil from any of the pipeline segments or launch areas modeled in the Beaufort Sea Program Area has at most a 1% probability of reaching the LBCHU after 360 days regardless of the season in which oil is spilled.

While the probability of oil reaching spring leads from a spill in the Chukchi Sea was higher, again oil from the majority of launch areas and pipelines had a very low probability of reaching the spring lead systems with oil from 18 of 26 launch areas and pipelines having a  $\leq 13\%$  probability of reaching the area, oil from 5 having a 21% - 27% probability of reaching the area, and oil from the remaining two areas having a 31% and 35% probability of reaching the spring lead system. For the LBCHU the largest probability of oil reaching this area was 56% for one of the 26 launch areas and pipeline segments, while oil from 22 of the 26 launch areas and pipeline segments had a  $\leq 11\%$  probability of reaching the LBCHU. Not surprisingly, oil released from launch areas and pipeline routes closest to these ERAs has the highest probability of reaching them.

In summary, for major impacts to listed eiders to result from the Action development must first occur (69% probability for the Beaufort Sea Program Area and 27% for the Chukchi Sea Program Area), if development occurs, a large marine spill would have to occur (26% probability for the Beaufort Sea Program Area and 40% for the Chukchi Sea Program Area). Further, the spilled oil would have to reach areas of concern, which as described above is not likely for the majority of potential spill sources.

*Potential Effects of a Large Oil Spill* - It is thought that all of the North Slope-breeding Steller's eiders and likely spectacled eiders migrate northward in the spring leads or broken ice near shore in the Chukchi Sea. Therefore, the Service believes it is possible for an oil spill in the spring lead system to contact and kill a majority of Alaska-breeding Steller's and spectacled eiders. This would be a catastrophic population-level mortality event for these species.

A population model developed by Dr. Barry Grand, USGS, under contract with MMS, to evaluate the consequences of oil spills on spectacled eiders was run under several scenarios to estimate population-level effects of an oil spill on molting spectacled eiders in the LBCHU (USFWS 2007b). The results of this analysis suggest that a potential oil spill associated with oil development in or near the LBCHU may affect the survival and recovery of the North Slope population of threatened spectacled eiders.

For most of the year when yellow-billed loons are at sea, they are widely distributed and at extremely low densities, which reduces the risk of population-level impacts from a large oil spill. Yellow-billed loons migrate singly or in pairs, but in spring they gather in polynyas, ice leads, and open shorelines near river deltas offshore of breeding areas prior to dispersing to nesting grounds in Alaska and Canada. Satellite telemetry data indicates individual loons may spend up to 1 month between Point Barrow and Cape Lisburne in the Chukchi Sea during migration (Schmutz *pers. comm.* 2008). Thus, the largest potential for mortality of large numbers of loons from an oil spill is from a large spill occurring in spring, in areas where these localized, temporary concentrations occur.

The Chukchi Sea Program Area is on the northern edge of the Kittlitz's murrelet's range in Alaska. Even in years when Bering Sea water and its associated fauna moves north into the Chukchi providing additional prey, the density of Kittlitz's murrelets in the northeast Chukchi is thought to be low (Divoky 1987). When in the marine environment, these birds are generally

solitary or found in very small flocks (Day et al. 1999). However, in late summer and fall, substantial numbers have been estimated along the ice edge in the central Chukchi Sea (1,000 to 5,000 birds; G. Divoky unpubl. data, cited by Day et al. 1999), and they may concentrate in other areas of the eastern Chukchi Sea. The Service believes that Kittlitz's murrelets could be exposed to and killed by a large oil spill reaching the eastern Chukchi Sea.

The LBCHU provides important habitat for molting spectacled eiders. The primary constituent elements of this critical habitat unit are marine waters  $\leq 75$  m in depth, along with the associated marine aquatic flora and fauna in the water column, and the underlying marine benthic community (Federal Register 66(25): 9146-9185).

If oil from a spill reached the LBCHU it would expose primary constituent elements of the critical habitat to effects of an oil spill. Whereas some of the features that contribute to the rich benthic community would not be affected by an oil spill (presence of the ocean shelf, particular water depth, the presence of spring leads and ice edges, and inflow of nutrient-rich Pacific water), other processes and components of the critical habitat would be adversely impacted. The high ice-edge primary productivity that drives the food web of Ledyard Bay could be altered by the physical and toxic effects of oil on the water or ice surface, entrainment in the water column, and direct and indirect effects on primary producers in the water column. The rich benthic invertebrate community that serves as the predictable food resource for spectacled eiders would probably be impacted both directly and indirectly by a large oil spill. Direct toxicity would reduce the abundance or biomass of benthic invertebrates, and the community composition could be altered by indirect effects. The Ledyard Bay benthic community could be impacted by an oil spill regardless of whether oil reaches the sea floor, due to changes in primary production near the surface that would have ramifications through the relatively simple and direct food chains and food webs occurring in the eastern Chukchi Sea.

Food resources used by eiders in the LBCHU could be displaced or reduced following an oil spill for an unknown length of time, and the remaining invertebrate prey species could bioaccumulate oil and subsequently contaminate eiders. Therefore, a large oil spill reaching this area could negatively impact critical habitat and its conservation value for spectacled eiders. The magnitude of impacts, and the degree to which the LBCHU's ability to support spectacled eiders will be compromised, would be determined by the amount of oil spilled, the amount entering the LBCHU, the degree to which the primary constituent elements of the LBCHU are affected, and the duration of the effects.

Although the impacts of a large oil spill that reach the LBCHU could be significant, the probability of such an event occurring is low, and cannot be said to be reasonably likely. For the Beaufort Sea Program Area, while MMS considers the probability of development occurring to be 69%, even if development were to occur here, the probability of a large oil spill over the 20-year production life of the development is estimated at only 26%. Further, even if development were to occur, and resulted in a large marine spill, MMS spill trajectory models indicate there is only a 0.5 % to 1% probability that oil from modeled launch areas or pipelines in the Beaufort Sea would reach the LBCHU even after 360 days (MMS 2008).

With regard to the Chukchi Sea Program Area, MMS estimates the probability of development occurring to be only 27%. In the unlikely event development were to occur here, MMS estimates the probability of a large spill occurring over a 25-year production life to be 40%. Even if such a spill were to occur, the likelihood of a spill from the modeled launch areas and pipelines actually reaching the LBCHU after 360 days is only 0.5 % to 13% for a winter spill. If a large spill were to occur in summer, there is again a range of possible outcomes. Oil spilled from 12 of the 15 launch areas modeled is estimated to have only a  $\leq 8\%$  probability of reaching the LBCHU, while the probability of oil reaching the LBCHU from the remaining three launch areas is 11%, 29%, and 43%, respectively. Of the 11 pipeline segments modeled there is a  $\leq 6\%$  probability that oil spilled from 7 of them would reach the LBCHU, an 11% probability that oil spilled from two of them would reach the LBCHU, a 39% probability that oil spilled from one of them would reach the LBCHU, and a 56% probability that oil spilled from the final one would reach the LBCHU. These data illustrate that a spill originating in much of the Chukchi Program Area has a low probability of reaching LBCHU.

These estimated oil spill probabilities show that based on the best available information at this time, it is not reasonably likely that a large spill from development in the Beaufort Sea or Chukchi Sea Program Areas is likely to reach the LBCHU. Thus, at this time, it is not reasonably likely that the LBCHU will be destroyed or adversely modified by appreciably reducing its functionality for the species' conservation as the primary constituent elements are not reasonably likely to be altered to an extent that impairs the conservation value of the critical habitat unit for spectacled eiders.

In summary, significant numbers of North Slope-breeding spectacled eiders and Steller's eiders could be exposed to an oil spill that entered important habitats, particularly those within the Chukchi Sea. Populations at risk including molting spectacled eiders in LBCHU where these flightless birds are especially vulnerable to a spill because they cannot be hazed away from oil, and both listed eiders species and a large proportion of yellow-billed loons during their spring migration through the spring lead system. In addition, it is possible that large numbers of Kittlitz's murrelets could be exposed to an oil spill that enters the central or southern portion of the eastern Chukchi Sea.

#### Toxics Contamination

Drilling production wells would generate drilling muds and cuttings. These wastes would likely be treated and disposed of in shallow wells or barged to shore treatment facilities so impacts to the marine environment would likely be negligible, unless shallow wells or shore treatment facilities were located within the LBCHU, spring leads, or other areas supporting large numbers of listed birds.

#### Collisions

As described above, migratory birds suffer substantial mortality from collisions with man-made structures. If development were to occur, several structures including offshore production platforms, shore base buildings and equipment, and pump stations could be constructed which may pose a collision risk for listed eiders and candidate species.

Collision risk is a function of proximity of structures to habitats used by these species, including migratory routes. Estimating the number of collisions is complicated by: 1) a lack of information on migration routes, behavior, and vulnerability to collisions with these types of structures; 2) uncertainty over the location of any development; and 3) the extent to which MMS's lease stipulations governing lighting and operations will reduce collision risk.

Because spectacled and Steller's eiders stage, molt, and winter in the Chukchi and Bering seas to the west of their North Slope nesting range, the entire North Slope population of each species could conceivably pass structures in the Chukchi Sea. In the Beaufort Sea Program Area, however, there is a significant longitudinal gradient in the numbers of eiders. Data from aerial surveys for breeding eiders (1993–2006) on the North Slope was combined to provide a longitudinal distribution of spectacled eider observations (MBM data). These data indicate that 58% of spectacled eider observations occurred east of Barrow, by Deadhorse this had dropped to 7% and <1% of observations were made east of Point Thompson. There are comparatively few Steller's eider observations, but they are concentrated in the area around Barrow. 63% of Steller's eider observations occurred east of Barrow, with only 12% of observations east of Cape Simpson. No Steller's eiders were observed at, or east, of Deadhorse.

Collision data for common eiders at Northstar Island (BP data provided to the Service) was compared to the population estimate for common eiders migrating across the Beaufort Sea (Quakenbush and Suydam 2004) to provide a strike rate (percentage of the population killed per year by collision with Northstar) of 0.0017% (see Section 8 – *Incidental Take Statement*). This collision rate can be used as a surrogate to assess potential impacts to Steller's and spectacled eiders, by converting it to a percentage and applying that to the estimated population sizes of listed eiders that may migrate past a structure.

For each structure in the Chukchi Sea, an estimated 0.44 spectacled eiders and 0.02 Steller's eiders could be killed each year. The number would likely be significantly lower for structures in the Beaufort Sea, and decrease the further east a structure is. Although yellow-billed loons and Kittlitz's murrelets may also be vulnerable to collisions, there are no records in the Service's North Slope collision database upon which to base a comparable estimate of potential collisions, and we have no evidence to suggest population level impacts to these species would result.

#### Increased Predation

No actions described in MMS's development scenario are likely to result in an increase of marine-based predators of listed or candidate species.

In the terrestrial environment, however, predator and scavenger populations may be increasing near sites of human habitation, such as villages and industrial infrastructure. Day (1998) conducted a comprehensive literature review examining four key predators of tundra-nesting birds, and concluded that individual glaucous gulls, grizzly bears (*Ursus arctos*), arctic foxes, and common ravens had increased survival and reproductive success when additional anthropogenic food sources such as garbage dumps were available. A population increase in these species could affect listed and candidate species through predation of eggs, young, and even adults.

If further development were to occur on the ACP, additional solid waste and garbage would be generated. Although practices in the existing North Slope oil fields have not prevented predators and scavengers from accessing human wastes, more recent regulations applied by BLM in NPR-A have required complete control of waste to address this problem. As food scarcity is probably the single most important population-limiting factor for arctic foxes (Burgess 2000), and is thought to play a major role in limiting glaucous gull populations (Day 1998, Rojek 2008), the Service anticipates that if similar policies and practices are applied to future development, adverse effects from increased predation by these species would be minimal.

New infrastructure may also lead to an increase in the number of ravens in the area by providing suitable nesting substrate. Ravens have expanded their breeding range on the North Slope by utilizing buildings and other manmade structures for nest sites (Day 1998), including the offshore facility Northstar Island (Powell and Bakensto 2009). Ravens have been observed depredating Steller's eider nests at Barrow (Rojek 2008), and feeding their young on waterfowl eggs in the Endicott Oil Field (Truett et al. 1997). The Service anticipates that standard operating procedures currently being developed on the North Slope would be applied to new development, but the effectiveness of the newer required practices is unproven.

### **Summary - Avian Species and LBCHU**

In the event of additional development in the Program Areas, the magnitude of adverse effects to listed and candidate species, and critical habitat, would be highly dependent upon the precise location and extent of development and production activities. However, adverse effects to listed and candidate avian species could occur from habitat loss, disturbance and displacement, collisions, and oil spills if they occur. Potential negative effects of toxics contamination, increased predators, and increased subsistence hunting are reasonably anticipated to be ameliorated by regulations, stipulations, and conservation efforts that already exist. Oil spills and habitat loss could negatively affect the primary constituent elements of the LBCHU possibly significantly diminishing its conservation role for spectacled eiders.

### **5.3.2 Polar Bears**

If development occurs, polar bears may be adversely affected by offshore and onshore facilities. As with avian species, the magnitude of impacts would likely vary by project location. Although polar bears are distributed at low densities across most of the Action Area, in fall the barrier islands of the Beaufort Sea may be inhabited by large numbers of polar bears. For example, the average number of polar bears recorded during fall counts at Barter Island where whale carcasses are disposed of in 2002-2004 was  $33.1 \pm 15.5$ , and at Cross Island  $6.1 \pm 3.8$  (Miller et al. 2006). We have evaluated the types and potential scale of impacts to polar bears that may result from the DSs, though actual impacts will certainly vary with amount, type, and location of development.

#### Habitat Loss

Gravel pads, roads, and mine sites that may result from the Action would impact terrestrial habitat. Polar bears use coastal areas for denning. Terrestrial dens in Alaska are sparsely distributed along a narrow coastal strip, with observations up to 61 km (37.9 mi) inland

(Amstrup and Gardner 1994). Denning habitat includes coastal bluffs, along river banks, and bluffs where snow accumulates early (Durner et al. 2003). While it is possible a small amount of potential denning habitat may be destroyed or altered by construction of a shorebase and other development activities occurring close to the coast, denning habitat is not limiting population size (Craig Perham, FWS - MMM Office *pers. comm.*) and adverse effects from habitat loss are not anticipated. Further potential denning habitat is protected across much of the Action Area through BLM's ROPs which preclude development within  $\frac{3}{4}$  mile of the coastline, and  $\frac{1}{2}$  mile of many rivers.

#### Physical Obstructions

There is little chance that development facilities that may result from the Action would act as physical barriers to movements of polar bears. Offshore and coastal facilities are most likely to be approached by polar bears. Yet because polar bears appear to have little or no fear of man-made structures and can easily climb and cross gravel roads and causeways, bears have frequently been observed crossing existing roads and causeways in the Prudhoe Bay oilfields. Offshore production facilities may present a small-scale, local obstruction to the bears' movement but the impact to individuals of this highly mobile species is likely negligible.

#### Disturbance and Displacement

During the ice-covered season, mobile non-denning bears and denning females could be disturbed by development activities. The best available scientific information indicates that female polar bears entering dens, or females in dens with cubs, are more sensitive to noise than other age and sex groups.

Disturbance can originate from either stationary or mobile sources. Possible stationary sources include maintenance, repair, and remediation activities; operations; flaring excess gas; and drilling. Mobile sources include vessel and aircraft traffic, ice road construction and associated vehicle traffic, including tracked vehicles and snowmobiles.

#### *Stationary Sources*

Disturbance from stationary activities could elicit several different responses in polar bears. Noise may act as a deterrent to bears entering the area, or conversely, it could attract bears. Bears attracted to development facilities may result in human-bear encounters, leading to unintentional harassment, or intentional hazing of the bear (see *Human-Bear Interactions* below).

However, there is evidence that disturbance from stationary sources results in minor changes in behavior of polar bears. Industry has been required to report polar bear observations to the Service as a requirement of their LOAs. Observations to date include numerous instances of polar bears encountering facilities changing their direction of movement and leaving the area.

During the ice-covered season, noise from stationary activities may potentially deter females from denning nearby, presumably displacing them to undisturbed habitat. Polar bears have, however, been known to den near industrial activities without any observed impact (Smith et al. 2007). For example, in 1991 two maternity dens were located on the south shore of a barrier

island within 2.8 km (1.7 mi) of a production facility, and in winter 2000-2001 and 2001-2002, active dens were located within approximately 0.4 km and 0.8 km (0.25 mi and 0.5 mi) of remediation activities on Flaxman Island in the Beaufort Sea (MacGillvray et al. 2003). However, female polar bears that are disturbed may abandon their dens early which can significantly reduce cub survival. In order to avoid impacts to denning polar bears, the oil Industry has often been required to conduct den detection surveys in potential denning habitat as a stipulation of their MMPA authorization. If dens are detected the Service's MMM Office generally requires a one mile radius buffer be placed around the den within which activities are precluded. It is likely similar stipulations would be imposed on future activities requiring MMPA authorization in the Action Area.

### *Mobile Sources*

During the open-water season, most polar bears remain offshore on the pack ice. Barges and vessels transporting materials for construction and on-going operations of facilities usually travel in open-water and avoid large ice floes. Therefore, there is some spatial separation between vessels and polar bears. If encounters do occur, adverse effects are limited to minor behavior changes as described above under the first incremental step. As described above, if there is an encounter between a vessel and a bear, it would most likely result in short-term behavioral disturbance only.

Extensive or repeated overflights by helicopters travelling to and from offshore facilities could disturb polar bears. Behavioral reactions of non-denning polar bears would likely be limited to short-term changes in behavior and have no long-term impact on individuals. While it is possible overflights may cause denning bears to depart their dens early in response to repeated noise, this is unlikely as helicopters travelling to and from offshore facilities are likely to use the same routes presumably allowing female polar bears to avoid heavily traveled areas for den sites or become habituated to this type of disturbance. In addition, MMS requires these types of flights to operate at an altitude of > 1,500 above ground level where possible, which would significantly reduce disturbance.

Ice roads may be constructed to transport personnel and equipment and supplies to and from facilities. If an ice road were to be constructed near a den it is possible a female and her cub(s) could abandon the den site, possibly leading to death of the cub(s). In an effort to prevent this, authorizations for these types of activities issued under the MMPA have required Industry to conduct pre-construction den detection surveys using FLIR imagery or scent-trained dogs to find polar bear dens in the ice road area and design the ice road or ice pad in an effort to avoid impacting the bears (usually by applying a 1-mile exclusion zone around the den). Future activities, such as those that may result from this Action, would also require authorization under the MMPA and it is likely that similar mitigation measures would be required as part any MMPA authorization.

If development were to occur in the Chukchi Sea, MMS anticipates construction of a road and oil pipeline to connect with existing infrastructure. Non-denning polar bears may be temporarily displaced, or their behavior modified (e.g., by changing direction or speed of travel), by traffic using this road but impacts are not anticipated to be significant. As disturbance from traffic on



the road is frequent and on-going, and confined to the road corridor, we assume denning females will either avoid the area or become habituated (Smith et al. 2007) to this source of disturbance and not suffer adverse effects from road disturbance during denning.

In summary, if development results from the Action polar bears may be disturbed by development activities. These disturbances will likely only affect non-denning bears, and be limited to small changes in behavior.

#### Human-Polar Bear Interactions

Although bears may be found along the coast during open-water periods, most polar bears in the Action Area inhabit the multi-year pack ice. Encounters at shorebases and terrestrial facilities are more likely to occur during fall and winter when greater numbers of polar bears are found in the coastal environment searching for food and possibly den sites.

Oil and gas activities in the Chukchi Sea to date have been limited to seismic surveys and exploratory drilling. However, we have data on the potential impacts to polar bears from oil development in the Beaufort Sea over the past 30 years. Polar bears have been observed with increased frequency near coastal and offshore production facilities, or along roads and causeways that link these facilities to the mainland. This is likely a result of climate change reduced ice coverage in the Beaufort Sea, forcing bears to concentrate along the coastline where they remain until ice returns. As the number of bears increases in the area, the likelihood of interactions between polar bears and Industry activities also increases.

In an attempt to prevent injuries to polar bears, or killing bears in defense of human life, Industry has sought and been granted permission under the MMPA to deter polar bears away from facilities by harassment. Harassment may include using vehicles to make noise, flashing lights, or firing cracker shells. Table 5.2 shows the number of bears observed at North Slope and Beaufort Sea oil developments, and the number that involved Level B harassment, as defined under the MMPA, where bears were deterred from the area without injury. No bears have been injured, and no lethal take of polar bears has occurred at these facilities.

**Table 5.2 – Number of polar bear observations and hazing actions reported at North Slope / Beaufort Sea oil facilities 2005-2008<sup>3</sup>.**

<b>Year</b>	<b>2005</b>		<b>2006</b>		<b>2007</b>		<b>2008</b>	
<b>Facility</b>	# Bears	# Hazed	# Bears	# Hazed	# Bears	# Hazed	# Bears	# Hazed
<b>Alpine</b>	1	1	4	0	2	0	3	0
<b>Badami</b>	4	1	1	1	0	0	1	1
<b>Endicott</b>	21	11	19	16	20	12	7	2
<b>Kuparuk</b>	8	7	3	1	12	2	7	2
<b>Liberty<sup>1</sup></b>	-	-	-	-	-	-	15	6
<b>Milne Point</b>	12	4	1	0	8	1	7	0
<b>Nikaichuq<sup>2</sup></b>	-	-	-	-	-	-	17	3
<b>Northstar</b>	14	1	5	3	19	4	7	2
<b>Ooguruk<sup>1</sup></b>	-	-	5	2	8	4	13	7
<b>Prudhoe</b>	49	18	13	5	15	1	30	5

<b>Bay</b>								
<b>Point Thomson<sup>1</sup></b>	-	-	-	-	-	-	10	0

<sup>1</sup>No operations occurred 2005-2007 at Liberty or Point Thomson; no operations occurred in 2005 at Oooguruk.

<sup>2</sup>No sighting data provided 2005-2007 for Nikaitchuq.

<sup>3</sup>Data from Industry.

If the DS occurs in the Beaufort Sea, we anticipate similar levels of interactions and harassment at these facilities as occurs at others existing facilities in the area. However, polar bears do not use the Chukchi Sea and adjacent Alaska coastline in the same ways they use the Beaufort Sea and North Slope (Craig Perham, MMM-FWS, *pers. com.*). The numbers of bears using and accessing the Alaska coastline of the Chukchi Sea during would likely be lower than the number of bears using the Beaufort Sea coastline, and interactions with offshore facilities would be related to their proximity to ice.

In addition to receiving Level B harassment authorization under the MMPA, Industry has also received LOAs for development operations in the Beaufort Sea. These LOAs have required mitigation measures, including development and implementation of a polar bear interaction plan. These plans include a range of measures such as: (1) use of detection systems, such as bear monitors, motion and infrared detection systems; (2) use of safety gates and fences; (3) implementation of appropriate garbage disposal and snow management procedures; (4) identifying the chain of command for responding to a polar bear sighting; and (5) employee training programs to educate field personnel about the dangers of bear encounters and how to implement safety procedures in the event of a bear sighting.

Since the Beaufort Sea ITRs went into effect in 1993, there has been no known instance of a bear being killed or industry personnel being injured by a bear as a result of oil and gas industry activities. The mitigation measures associated with these regulations have been proven to minimize human-bear interactions and will therefore, likely be required by any future authorization provided under the MMPA.

#### Crude Oil and Refined Oil Spills

The effects of crude and refined oil on polar bears were discussed under the first incremental step analysis; based on these effects we assume polar bears that contact oil, or eat oiled prey items are likely to die. MMS anticipates that if the DSs occur small spills of oil are likely, and there is a 26% probability of a large spill from the Beaufort Sea Program Area DS and a 40% probability of large spill from the Chukchi Sea Program Area DS.

*Small Spills* – As described in the first incremental step analysis, these spills are low volume, are often into containment, and have a high recovery rate. Given these factors and the low density of polar bears in the Beaufort and Chukchi Sea Program Areas, even if a spill reaches the environment there is a low likelihood polar bears would be affected by small spills. It is possible, although unlikely, that low numbers of polar bears could encounter oil from small spills.

*Large Spill* – The most significant impacts to polar bears that may result from the DSs is a large marine oil spill in the Beaufort or Chukchi seas. Polar bears could encounter oil spilled during open-water or ice-covered seasons in offshore or onshore habitat. Oil is influenced by seasonal weather and sea conditions, including temperature, winds, and for offshore events, wave action and currents. Oil may also accumulate at the ice edge, in ice leads, and other areas of importance to polar bears.

Weather and sea conditions would also affect the type of equipment needed for spill response and how effective spill cleanup would be. Spill response drills have been unsuccessful in the cleanup of oil in broken-ice conditions. In addition, based on clean-up activities with the Exxon Valdez oil spill, spill response may be largely unsuccessful in open water conditions. These factors, in turn, would dictate how large spills impact polar bear habitat and individuals.

During the ice-covered season, mobile, non-denning bears would have a higher probability of encountering oil than non-mobile, denning females. However, these bears occur at very low densities across the Action Area and large numbers are unlikely to be impacted. The most significant impacts would occur if oil reached barrier islands where tens of polar bears are known to congregate in fall (Miller et al. 2006). Although polar bears may be killed, it is possible mitigation measures such as deterring bears away from an oiled area could reduce the number of bears contacting oil.

The global population is estimated to be 20,000-25,000 bears (Schliebe et al. 2006). Polar bears are listed under the ESA range-wide, so analysis to determine if an Action would jeopardize the continued existence of the species occurs at the range-wide scale. Therefore, although the loss of tens of bears resulting from an oil spill in the Beaufort Sea which reaches the barrier islands (the worst case scenario for the DS), coupled with other impacts from development activities, subsistence hunting, and impacts described in the environmental baseline is significant; it does not reach the threshold of jeopardizing the continued existence of the species by significantly reducing the numbers, distribution, or reproduction of polar bears.

#### Toxic Contamination

Industrial development of any kind in polar bear habitat may also expose individuals to hazardous substances through improper storage or spills. For example, one polar bear died in Alaska from consuming ethylene glycol in 1988 (Amstrup et al. 1989). Although it is possible that polar bears may be adversely affected by toxic contamination that may result from development given the sparse distribution of polar bears it is unlikely that such an incident would impact more than a very small number of individuals.

#### Impacts to Prey Species

Ringed seals are the primary prey of polar bears and inhabit the nearshore waters of the Action Area. Seals may be adversely affected through contamination such as oil spills and noise disturbance from industrial activities. Studies have shown that seals can be displaced from certain areas, such as pupping lairs or haulouts, and abandon breathing holes near oil and gas industry activity (Kelly et al. 1988). However, significant effects to these species from existing oil development activities in the Beaufort Sea have not been documented (Moulton et al. 2003).

cited by MMS 2008), and we do not anticipate significant impacts to polar bears will result from the DSs effects on prey species.

#### **5.4 Indirect Effects**

It is possible that if additional oil and gas development resulted from the Action it could facilitate additional oil and gas development in adjacent areas such as Native owned lands, State waters, and Federal land such as NPR-A above that previously predicted and consulted on in prior BOs. However, the nature and extent of this additional development is unknown at this time. Oil and gas development in these areas, both offshore and terrestrial, would require Federal permits. Therefore, if a development is proposed issuance of Federal permits would trigger a review and consultation under section 7 of the ESA to ensure the proposed activity would not jeopardize any listed or proposed species.

#### **5.5 Interrelated and Interdependent Effects**

Interdependent actions are defined as “actions having no independent utility apart from the proposed action,” while interrelated actions are defined as “actions that are part of a larger action and depend upon the larger action for their justification” (50 CFR §402.02). The Service has not identified any interdependent or interrelated actions that may result from the Action that could result in additional effects to listed species.

### **6. CUMULATIVE EFFECTS**

Under the ESA, cumulative effects are the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the Action Area considered in this BO. Future Federal actions are not considered in this section because they will require separate consultation under the ESA. In addition to the federally controlled OCS area, the Action Area is comprised of State waters, and a terrestrial component, the majority of which is under Federal management through the Bureau of Land Management. In order to assess potential cumulative impacts the Service considered the following types of activities:

#### *Further Oil and Gas Development*

Further oil and gas development, whether in Federal or State waters or in the terrestrial environment on State, private, Native-owned, or Federal lands, would require Federal permits (such as section 404 of the Clean Water Act authorization from the U.S. Army Corps of Engineers (COE), and National Pollution Discharge Elimination System permits from the Environmental Protection Agency) and, therefore, are not considered cumulative impacts under the ESA.

#### *Gas Line*

MMS now considers the development and export of North Slope natural gas via pipeline to be reasonably foreseeable. While much of this line is likely to be on State lands, a project of this magnitude would require Federal permits and section 7 consultation. It is therefore, not a cumulative effect under the ESA.

### *Community Growth*

As described in Section 4 – *Environmental Baseline*, community growth is anticipated to continue across the North Slope. The footprints of North Slope villages will likely increase, along with associated infrastructure such as roads, powerlines, communication towers, landfills, and gravel pits and these activities may adversely affect listed species. The scale of impacts will depend not only on the amount of growth, but the location as it relates to habitat. For example, community development projects at Barrow may potentially impact Steller’s eiders to a much higher degree than developments at Point Lay.

Because over 97% of the Action Area is wetlands or open water (USGS National Land Cover Database), and listed eiders breed and use wetland areas, a section 404 permit from the COE would likely be necessary for all large scale community development projects that may impact eiders. The issuance of these permits would also trigger consultation under the ESA. Smaller projects may not require a Federal permit, but are also likely to have a smaller, if any, impact to listed species.

As the population of North Slope communities increases so does the number of subsistence hunters in the Action Area. This could adversely affect listed eiders and yellow-billed loons through direct shooting of these birds and contamination of habitat by lead shot. As human population grows so does the probability of human-polar bear encounters and likely subsistence harvest of polar bears. As described in Section 5 – *Effects of the Action*, both law enforcement and education and outreach activities are on-going across the North Slope, and aim to eliminate illegal harvest of listed eiders and yellow-billed loons.

### *Commercial fishing*

Reduction in the extent and duration of sea ice may increase the potential for commercial fishing, but the likelihood and magnitude of these activities are unknown at this time. Future commercial fisheries in the Action Area would likely be managed by the National Marine Fisheries Service, and the issuance of regulations would require section 7 consultations, and are therefore not considered cumulative effects.

### *Increased Marine Traffic*

As the extent of arctic sea ice in the summer has declined, and the duration of ice free periods has increased, interest in shipping within and through arctic waters (Brigham and Ellis 2004) has increased. Ships operating, or that could operate in the area include military vessels, pleasure craft, cruise ships, barges re-supplying communities, scientific research vessels, and vessels related to resource development such as oil, gas, and minerals. The potential increase in the number of vessels operating in arctic waters has been matched by an increase in coastguard activities. The United States Coast Guard conducted a number of major exercises in Arctic waters during 2008 for which section 7 consultations were conducted.

Increased marine traffic could impact listed species through disturbance, and more significantly from an accidental fuel spill. However, we have no data on the number of vessels that may operate in these waters in the future and the magnitude of potential risk they pose. As more

information becomes available we will amend the environmental baseline and consider these impacts in future section 7 consultations and later increments of this section 7 consultation.

### *Increased Scientific Research*

Scientific research across the Arctic is increasing as concern about effects of climate change in the arctic grows. While research is often conducted by universities and private institutions, many activities take place in NPR-A which require land use authorization by BLM, and large scale projects in the marine environment are generally funded by NSF or operate off U.S. Coast Guard ice breaking vessels and are therefore considered in other section 7 consultations.

### *Conclusion*

In summary, we anticipate oil and gas development, community growth, scientific activities, and other activities will continue in the Action Area in coming decades. Most notably activities with potential to affect significant numbers of individuals of listed species (such as oil and gas development and community growth) are expected to require consultation under the ESA, whereas those that may not require consultation (e.g., small projects in developed areas such as home renovation, and non-commercial shipping) will likely have minor impacts to only a few individuals.

## **7.0 CONCLUSION**

### **7.1 Introduction**

This BO evaluates the potential impacts of the Action in the Beaufort and Chukchi Sea Program Areas, and was conducted as an incremental step consultation. As an incremental step consultation, this BO must address whether:

- (i) The first incremental step of seismic surveys and exploratory drilling activities, violates section 7(a)(2) of the ESA; and
- (ii) There is a reasonable likelihood the entire Action will violate section 7(a)(2) of the ESA.

To reach a conclusion, impacts of the incremental steps of the Action are not considered in isolation, but are placed in the context of the status of the species and critical habitat at this time, the current environmental baseline, and cumulative effects (as defined by the ESA).

Although the ESA does not require consultation for candidate species, by mutual agreement with MMS, we have evaluated the potential impacts to Kittlitz's murrelets and yellow-billed loons, in anticipation of possible future listing.

### **7.2 Conclusion for the First Incremental Step**

This portion of the BO considers impacts to listed Steller's and spectacled eiders, polar bears, critical habitat and candidate species that may result from the first incremental step of the Action (seismic surveys and exploratory drilling). The potential effects of these activities were considered aggregative and in the context of information on the current status of spectacled eiders, Steller's eiders, polar bears, and the LBCHU; the environmental baseline for the Action

Area; and cumulative effects. In our analysis of the impacts to critical habitat we relied upon the statutory provisions of the ESA. After considering these aggregate effects on the species and LBCHU, it is the Service's biological opinion that this incremental step is not likely to jeopardize the continued existence of any of these species, nor will it destroy or adversely modify critical habitat. This conclusion is predicated on incidental take estimates detailed in Section 8 – *Incidental Take Statement*.

In evaluating the impacts of this incremental step to listed species, the Service identified a number of adverse effects that may occur. These are discussed more fully in Section 5 – *Effects of the Action* and are summarized below. Incidental take has been authorized for activities that may adversely affect listed eiders. Impacts to polar bears were assessed in order to ensure the activities that may result are compliant with section 7(a)(2), and potential incidental take of polar bears was enumerated. However, incidental take of polar bears is not provided in this BO, because incidental take of marine mammals must be authorized under the MMPA prior to authorization under the ESA.

### **7.2.1 Listed Eiders and Candidate Species**

As detailed in Section 5 – *Effects of the Action*, no measurable adverse effects to listed and candidate species from habitat loss, disturbance/ displacement, increase in subsistence hunting or predation, or toxic contamination are anticipated to result from seismic surveys and exploratory drilling activities. However, seismic surveys and exploratory drilling may result in collision and possibly small oil spills, which could adversely affect these species.

Collisions between birds and human-built structures are episodic in nature and it is difficult to quantify the collision risk for listed eiders from seismic survey and drilling vessels and their support ships using the short-term datasets that are available. However, our estimate of incidental take is 12 spectacled eiders over 12 years (i.e., 1 spectacled eider / year) out of a North Slope breeding population estimated at 12,916 and a listed population estimated at 363,000 (Stehn et al. 2006), and < 1 Steller's eider over the entire 12 years out of an estimated listed population of 576 (Stehn and Platte 2009). The incidental take estimates are based on the best information available at this time and we believe it is unlikely that we have underestimated potential effects. In addition, MMS's lease stipulations requiring lighting protocols for vessels operating in the Beaufort and Chukchi seas will likely reduce collision risk. The ultimate effectiveness of this mitigation is unknown, however, so the incidental take estimates have not been adjusted to reflect the benefits these stipulations may confer. We have no data with which to estimate potential collision mortality of yellow-billed loons and Kittlitz's murrelets, however, the limited data we have from existing oil and gas facilities in the Beaufort Sea does not suggest large numbers have collided with any structures.

MMS considers a large spill of crude oil to be extremely unlikely to result from seismic survey and exploratory drilling activities; therefore, the effects of such spills were not analyzed under the first incremental step. However, small spills of refined oil products are considered likely. These spills are low volume, often into containment, and the oil is often recovered if it reaches the environment, further, the density of listed eiders and candidate species in most of the Program Areas is very low. Moreover, there is a spatial and temporal separation between those

areas where the density of listed eiders is high and the areas where seismic survey and exploratory drilling activities may occur. Thus, even if a spill reaches the environment it is unlikely that more than a few individual listed or candidate birds would contact the oil and be adversely affected.

### **Conclusion – Listed Eiders and Candidate Species**

Activities that may result from the first incremental step are likely to adversely affect listed eiders and candidate species. The activities in this first step are limited in number, further listed and candidate avian species occur at very low densities across most of the Chukchi and Beaufort Sea Program Areas. In areas where these species occur in large numbers or high densities seismic survey and exploratory drilling activities are either completely excluded, or will be conducted in a manner that significantly reduces potential impacts. Further, even if seismic surveys and exploratory drilling activities intersect with listed and candidate species the impacts are limited to at most the death of a very low number of individuals through collisions (<1 Steller's eider and 12 spectacled eiders over a total of 12 years), and possibly although very unlikely the death of a few individuals in the event a small spill contacts these birds. Therefore, Service concludes this potential level of take, considered in aggregate with and in the context of the status of the species, environmental baseline, and cumulative effects, is not likely to jeopardize the continued existence of listed Steller's and spectacled eiders and the candidate species yellow-billed loons and Kittlitz's murrelets by reducing appreciably the likelihood of survival and recovery of these species.

### **7.2.2 Ledyard Bay Critical Habitat Unit**

As described in Section 5 – *Effects of the Action* impacts to the LBCHU from activities authorized in the first incremental step of the Action are only anticipated to have minor, short-term impacts, and will not significantly impact any of the primary constituent elements of critical habitat. The critical habitat unit will still provide the conservation function for which it was designated, namely to provide a rich source of benthic invertebrates and aquatic flora and fauna in waters of an appropriate depth to support molting spectacled eiders. Therefore, the Service concludes this increment of the Action will not alter the primary constituent elements to an extent that appreciably reduces the conservation value of critical habitat for spectacled eiders.

### **7.2.3 Polar Bears**

Previous section 7 consultations have considered oil and gas activities in the Program Areas and how they may affect polar bears. The Beaufort Sea ITRs and corresponding BO evaluated and authorized impacts from seismic survey activities, exploratory drilling, and existing development projects in the Beaufort Sea until the regulations expire in August 2011. The Chukchi Sea ITRs and corresponding BO evaluated and authorized impacts from seismic surveys and exploratory drilling activities in the Chukchi Sea until June 2013.

The Service concluded these activities, when tempered by mitigation measures described in the ITRs, would likely pose negligible and non-jeopardy level threats to polar bears (Federal Register 71(148):43926-43953, USFWS 2008a, Federal Register 73(113):33212-33255, USFWS 2008b).



Impacts from seismic surveys and exploratory drilling activities that may be conducted under the first incremental step of the Action are anticipated to result in similar levels of impacts as those resulting from activities previously authorized under the Beaufort and Chukchi Sea ITRs. As described in Section 8 – *Incidental Take Statement* we estimate that up to 5 polar bears may be observed by each seismic operation per year, and an estimated 22 polar bears may be observed by each exploratory drilling operation over a year. Not all of the polar bears observed during similar previous operations responded to them, and if they did respond response was limited to watching, or changing their direction of travel. We anticipate any future operations would result in similar levels of response. Given the low numbers of operations, and the small proportion of the listed population that may encounter them, coupled with the short-term, minor behavioral responses of polar bears to these activities, the Service concludes the incremental step of seismic surveys and exploratory drilling will not jeopardize the continued existence of polar bears by reducing appreciably the likelihood of survival and recovery of the species.

### **7.3 Conclusion for the Entire Action**

In addition to considering the effects of activities permitted under the first incremental step of seismic surveys and exploratory drilling, we also analyzed the effects of the entire Action including development in the Chukchi and Beaufort seas, as described in MMS's DSs, to determine if the entire Action would violate section 7(a)(2) of the ESA.

At this time it is difficult, if not impossible to predict whether, how much, when, and where development will occur. MMS developed a DS for each Program Area based on currently available information and these were used as the basis for our evaluations of potential impacts. The DSs provide the best information available at this time for assessing potential future impacts.

MMS estimates that additional development in the Beaufort Sea Program Area has a 67% probability of occurring, while development in the Chukchi Sea Program Area has an estimated probability of 27%. Thus it is not certain that additional offshore development will occur in the Beaufort Sea Program Area, and there is a roughly 1 in 4 chance it will occur in the Chukchi Sea Program Area.

Even if development occurs in either Program Area, there is a significant range in potential impacts depending on the scale, location, and management of actual development projects. In the Beaufort Sea, MMS's DS estimates one 0.5 billion barrel project with one offshore facility collecting oil from up to three fields before transporting hydrocarbons via subsea pipeline to a shorebase at either Cape Simpson, Deadhorse, or Point Thompson. Product would then be transported to TAPS or a gas line. In the Chukchi Sea, the scenario includes one 1 billion barrel field with a single offshore facility and satellite wells with subsea pipelines transporting product to a shorebase at an unknown location before a terrestrial pipeline moves the product to the TAPS / gas line.

We previously authorized, and have learned from, a number of offshore oil development projects in the Beaufort Sea region including Northstar (USFWS 1999), Liberty (USFWS 2007b), Oooguruk (USFWS 2006a), and Niqiatchuq (USFWS 2006b). These have been evaluated under

section 7 of the ESA to assess impacts to listed eiders and the LBCHU, and in all cases we concluded the proposed projects were not likely to jeopardize listed species or result in the destruction or adverse modification of critical habitat. Since authorizing these projects, no unexpected impacts to listed resources have occurred suggesting that properly managed and mitigated development projects can occur in habitats occupied by listed species in arctic Alaska. As described in Section 4 – *Environmental Baseline*, estimates of incidental take for these projects are minimal. The addition of another offshore facility with a landfall at an existing developed location connecting into TAPS as described in MMS’s DS would likely have similar, minimal impacts as these previous Beaufort Sea development projects. At this time, considering the status of species and the current environmental baseline, the additional impacts that may result from a new development such as the one described in MMM’s DS are not likely to jeopardize the continued existence of listed species by appreciably reducing their survival or recovery.

Our greatest concern for possible population level impacts of oil and gas development to any listed and candidate species and critical habitat unit has been, and remains, large marine oil spills. None have occurred in arctic Alaska to date, but this does not demonstrate that the risk of such a spill is zero. Spill risk in an area is related to the number of projects, production facilities, and pipelines in the area that pose a spill risk. Hence, overall spill risk increases with increasing development. As we have noted in previous BOs, impacts to listed species from possible spills could range from relatively low (USFWS 2007b) to significant, and possibly even jeopardy (USFWS 2007c).

Section 7(a)(2) of the ESA requires each Federal agency to ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat determined by the Secretary to be critical. 50 CFR §402.02 defines “jeopardize the continued existence of” as “to engage in an action that *reasonably would be expected* (italics added), directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of listed species in the wild by reducing the reproduction, numbers, or distribution of that species.” Thus for a jeopardy determination to be made, impacts sufficient to cause jeopardy must be *reasonably expected* to occur.

For the sum total of impacts to rise to the level of jeopardizing the continued existence of any listed species or altering the primary constituent elements of critical habitat to an extent that appreciably reduces the conservation value of the LBCHU we believe a large marine oil spill would have to occur, and that such a spill would have to reach large numbers (i.e., a large proportion) of one or more listed species or the LBCHU. We do not believe this is reasonably likely to occur in either the Beaufort Sea or Chukchi Sea Program Area. As we have analyzed and explained previously, all of the following events must take place for the Action to jeopardize the continued existence of listed and candidate species or result in the destruction or adverse modification of critical habitat:

- Development must occur (MMS estimates there is a 67% probability of additional development in the Beaufort Sea Program Area, and a 27% probability in the Chukchi Sea Program Area); and

- One or more large oil spills must occur (*if* development occurs, MMS estimates there is a 26% probability of a large spill in the Beaufort Sea Program Area and a 40% probability in the Chukchi Sea Program Area); and
- Even a large spill occurs, spilled oil must reach areas used by large numbers of one or more listed species, when the species is present, or must compromise the habitat's ability to support the species in the long-term. MMS estimates that if development occurs, and a large spill occurs then there is a  $\leq 0.5$  to 15% probability it would reach the spring lead system or LBCHU from the Beaufort Sea DS, and a  $\leq 0.5$  to 56% probability for the Chukchi Sea DS if development occurs, with the majority of modeled oil spills having low probabilities of reaching these areas.

Based on the estimates of the likelihood of development, spill risk estimates (combined with the limited history of no large marine spills in the region to date), and the vastness of the region in relation to the number and relatively confined distribution and areas of concentration of listed species, we do not believe this series of events is reasonably likely to occur. Therefore, given the estimated level of impacts that are reasonably likely to result from the Action, it is the Service's biological opinion that the proposed Action does not violate section 7(a)(2) of the ESA at this time.

However, should further oil and gas development ultimately occur in the Program Areas it could result in adverse effects to listed species through habitat loss, disturbance, avian collisions with structures, and, most significantly, through potential oil spills. The magnitude of these impacts would vary depending upon the location, amount, and type of development. If actual development is within, or proximal to areas used by large numbers of listed eiders or polar bears, or poses significant risk of a spill that could reach concentrations of listed species or destroys food resources or other important habitat components, the impacts could be significant and may result in jeopardy or adverse modification. It is incumbent upon lessees proposing to develop oil/gas resources in the Chukchi and Beaufort Sea Program Areas to design future production projects that would likely not result in jeopardy or destruction or adverse modification of critical habitat.

Further, this conclusion is based on the current status of species and environmental baseline. Our conclusion may be different when a development is actually proposed if the status of one or more listed species or the environmental baseline changes significantly in the interim.

If development projects are proposed, section 7 consultation will be conducted on the project as described in 50 CFR §402.14(k) which requires the action agency (MMS) to continue consultation with respect to the entire action, and obtain BOs, as required, for each incremental step. This consultation will consider the effects of a development project in relation to the status of the species at the time development is proposed, and other factors including other Federal actions that may have impacted the environmental baseline, and cumulative effects on listed species.

All subsequent OCS development activities are required to go through this process, and if warranted, a jeopardy determination could be made at any point. Therefore, the incremental step

consultation, combined with the ability to reinitiate consultation in the event that circumstances change, provide considerable procedural safeguards to protect listed species affected by oil and gas development in the OCS.

Under the incremental step consultation approach, MMS has continuing obligations to:

- Avoid irreversible or irretrievable commitment of resources that would prevent implementation of reasonable and prudent alternatives to the Action (development/production) at a later date; and
- Obtain sufficient data upon which to base the final BO for subsequent incremental steps.

We wish to provide clear notification that consultations on subsequent incremental steps may reach different conclusions depending on the scope, location, and nature of activities actually proposed, or changes in species status or environmental baselines. Based on our analysis, we believe that some potential development proposals could conceivably jeopardize listed species or cause destruction or adverse modification of critical habitat. However, as described above, at this time we cannot say that these impacts are reasonably foreseeable. Therefore, we believe that MMS and industry must remain fully aware of the need to consult on subsequent increments and the potential for jeopardy or destruction or adverse modification conclusions to be reached in future consultation. Further, we believe that MMS and industry should recognize that the need to develop reasonable and prudent alternatives to avoid jeopardy or destruction or adverse modification of critical habitat, and reasonable and prudent measures to minimize impacts of development/production and the impacts of potential oil spills, could impact future development.

To reduce the likelihood of jeopardy or adverse modification conclusions at later incremental steps, we recommend that MMS and industry:

- Avoid proposing infrastructure in important eider habitats, including the LBCHU, spring leads, nesting habitat near Barrow, areas with high density of nesting spectacled eiders in NPR-A, and areas where large number of polar bears are known to congregate (e.g. Barter and Cross Islands);
- Avoid proposing development in areas where spilled oil has a high risk of reaching the LBCHU, spring leads, or areas used by large numbers of polar bears (e.g., Barter and Cross Islands); and
- Improve technology to reduce the maximum amount of oil that can be spilled in marine areas, which has great bearing on potential risk to wildlife in marine areas.

## **8. INCIDENTAL TAKE STATEMENT**

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in

any such conduct. “Harm” is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, but not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

The measures described below are non-discretionary, and must be undertaken by MMS so they become binding conditions of any grant or permit issued to an applicant, as appropriate, for the exemption in section 7(o)(2) to apply. MMS has a continuing duty to regulate activities covered by this incidental take statement. If the MMS (1) fails to implement the terms and conditions, or (2) fails to require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, MMS must report the progress of the Action and its impact on the species to the Service as specified in the incidental take statement.

This incidental take statement first discusses listed eiders and then polar bears. For Kittlitz’s murrelets and yellow-billed loons, prohibitions against taking species found in section 9 of the ESA do not apply unless these species are listed; therefore no incidental take is authorized. However, implementation of the reasonable and prudent measures to reduce impacts to listed eiders will likely benefit these candidate species due to similarities in habitat use and the mechanisms through which oil and gas development may affect marine birds.

### **8.1 Listed Eiders**

This BO only authorizes incidental take for the first incremental step (seismic surveys and exploratory drilling) of the Action. MMS must continue consultation for each subsequent incremental step, and incidental take for subsequent incremental steps may be authorized when the proposed developments are evaluated. As described in Section 5 - *Effects of the Action*, seismic surveys and exploratory drilling may adversely affect Steller’s and spectacled eiders through collisions with structures and oil spills.

#### *Collisions*

During exploratory operations large drill rigs would be present in the marine environment posing a collision risk for listed eiders. Collision risk is a function of proximity of structures to habitats used by these species, including migratory routes. Estimating the number of collisions is complicated by: 1) a lack of information on listed eider migration routes, behavior, and vulnerability to collisions with these types of structures; 2) uncertainty over locations of activities in the Action Area; and 3) the extent to which MMS’s lease stipulations governing lighting and operations will reduce collision risk.

Because spectacled and Steller's eiders are believed to stage, molt, and winter in the Chukchi and Bering seas to the west of their North Slope nesting range, in the absence of information about vessel location, the Service assumes the entire North Slope population of each species could conceivably pass by an exploratory drillsite in the Chukchi Sea during fall migration and be at risk of collision.

In the Beaufort Sea there is likely a significant longitudinal gradient in the distribution of eiders reflecting their nesting distribution. Data from aerial surveys for breeding eiders (1993–2006) on the North Slope was combined to provide a longitudinal distribution of spectacled eider observations (Service Migratory Bird Management data). These data indicate that 58% of spectacled eider observations occurred east of Barrow, by Deadhorse this had dropped to 7% and <1% of observations were made east of Point Thompson. There are comparatively few Steller's eider observations, but they are concentrated in the area around Barrow. 63% of Steller's eider observations occurred east of Barrow, with only 12% of observations east of Cape Simpson. No Steller's eiders were observed at, or east, of Deadhorse.

Therefore, the location of exploratory activity in the Beaufort Sea will determine the number of listed eiders that may encounter these structures. Without knowing the location of future exploration activities to ensure we do not underestimate the potential incidental take through collisions, the Service assumes all listed eiders that nest east of Barrow may encounter exploratory activity in the Beaufort Sea during their spring and fall migrations.

Some estimate of vulnerability is required to estimate collision risk, but no specific data on spectacled or Steller's eider collision rates are available. We therefore used recorded numbers of common eider (*Somateria mollissima*) collisions at the human built Northstar Island in the Beaufort Sea as a surrogate. In 2000-2006, respectively 5, 8, 0, 3, 5, 0, and 0 common eiders were recorded as colliding with the island, for an average of 3/year (data reported by BP Alaska to the Service).

A strike rate (percent of population killed per year) was then estimated as the annual average of Northstar Island common eider strikes divided by 176,109, the population estimate of common eiders migrating across the Beaufort Sea at that time (Quakenbush & Suydam 2004), according to the following formula:

$$\frac{\text{Annual average number of strikes}}{\text{Population estimate}} \times 100 = \text{Percent of population killed each year by collisions (strike rate)}$$

or:

$$\frac{3}{176,109} \times 100 = 0.0017\%$$

We assume spectacled and Steller's eider collision risk is similar to that of common eiders at Northstar, and this strike rate was applied to the population migrating through the area. For the Chukchi Sea, we used the current North Slope breeding population estimates for spectacled and Steller's eiders (12,916 and 576, respectively, as described in Section 3 - *Description of the*

*Species*). For the Beaufort Sea, the populations of listed eiders occurring east of Barrow was estimated at 58.43% of 12,916 = 7,547 spectacled eiders; and 62.67% of 576 = 361 Steller's eiders. The mortality rate was estimated as follows:

Strike rate x population estimate = number killed per year per drill structure.

MMS estimates a maximum of two drill structures may operate in each of the Beaufort and Chukchi Sea Program Areas annually until 2022, i.e., there could be 24 drill units / Program Area, based on two drilling operations in each Program Area for 12 years. In the Beaufort Sea listed eiders may encounter them in both spring and fall migrations, thus a total of 48 drill units were used in the Beaufort Sea calculations. Incidental take was estimated by multiplying the mortality rate by number of drill units for each Program Area, as shown below:

#### Chukchi Sea

Steller's eider mortality rate = 0.0017% (strike rate) of 576 (population estimate) = 0.01 birds/structure. Total estimate of number killed = 0.01 birds x 24 structures = 0.235 Steller's eiders.

Spectacled eider mortality rate = 0.0017% of 12,916 (population estimate) = 0.22 birds/structure. Total estimated number killed = 0.22 birds x 24 structures = 5.27 spectacled eiders.

#### Beaufort Sea

Steller's eider mortality rate = 0.0017% (strike rate) of 361 (estimated population at Barrow) = 0.006. Total estimated number killed = 0.006 x 24 structures x 2 migration seasons = 0.2946 Steller's eiders.

Spectacled eider mortality rate = 0.0017% (strike rate) of 7547 (estimated population at Barrow) = 0.128. Total estimated number killed = 0.128 x 24 structures x 2 migration seasons = 6.16 spectacled eiders.

This provided a total estimate of 11.43 (12) spectacled eiders killed through collisions over 12 years of exploration and 0.53 (<1) Steller's eiders killed.

We believe we have likely significantly overestimated the incidental take that may occur as a result of collisions as they are based on a number of assumptions: 1) the maximum amount of exploration predicted occurs in every year; 2) the lease stipulations controlling lighting and other aspects of exploration do not reduce the amount of incidental take; and 3) all listed eiders nesting east of Barrow would encounter a structure in the Beaufort Sea Program Area. However, the take was estimated using the best available data and we don't believe we are underestimating impacts to listed species by using this approach.

#### *Spills*

There is always some risk of oil, fuel, or toxic spills associated with seismic surveys and exploratory drilling. However, MMS's oil spill analysis indicates a large spill is unlikely (i.e., not reasonably likely to occur). While small spills of refined products are likely to occur, as

discussed in Section 5 – *Effects of the Action*, these are not anticipated to result in impacts to listed eiders. Further, spills are not an otherwise legal activity, so no incidental take is provided.

## 8.2 Polar Bears

### *Protections under the Marine Mammal Protection Act*

All activities that may take<sup>6</sup> polar bears are subject to prohibitions of the MMPA. However, there are several mechanisms through which the incidental take of small numbers of marine mammals, including polar bears, can be authorized under the MMPA. The most commonly used is through the issuance of incidental take regulations (ITRs). Before the Service can provide incidental take authorization for polar bears under the ESA, take of marine mammals must first be authorized under the MMPA.

On August 2, 2006 ITRs were issued for the Beaufort Sea ITRs (71 FR 43925). These ITRs assessed seismic surveys, exploratory drilling, development, and production activities in the Beaufort Sea and adjacent North Slope. Letters of Authorization (LOAs) issued under these regulations can authorize the non-lethal, incidental, unintentional take of small numbers of polar bears and Pacific walrus during year-round oil and gas industry exploration, development, and production operations in the Beaufort Sea and adjacent northern coast of Alaska until August 2, 2011. Incidental take regulations for seismic surveys and exploratory drilling activities in the Chukchi Sea and adjacent coast were issued on June 11, 2008 (73 FR 33212). LOAs issued under these regulations can authorize the non-lethal, incidental, unintentional take of small numbers of polar bears and Pacific walrus during year-round oil and gas industry exploration, operations in the Chukchi Sea and adjacent western coast of Alaska until June 11, 2013.

Seismic surveys and exploratory drilling activities in both the Chukchi and Beaufort seas, including those that may result from the first incremental step of the Action, are currently included and authorized under the Beaufort and Chukchi Sea ITRs. Entities (e.g., Industry) seeking authorization for particular projects under these ITRs may apply for a LOA from the Service's Marine Mammals Management (MMM) Office to conduct these activities.

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<sup>6</sup> As defined by the MMPA, take means “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal” (§3(13)). The definition is expanded in Pub. Law at 16 U.S.C. 1361§ 3(18)(A)(C) and (D) ... including, without limitation, any of the following: The collection of dead animals or parts thereof; the restraint or detention of a marine mammal, no matter how temporary; tagging a marine mammal; or the negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in the disturbing or molesting of a marine mammal.” *Harassment* means “any act of pursuit, torment, or annoyance which – (i) has the potential to injure a marine mammal or marine mammal stock in the wild; 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” (§3(18)(A)). The MMPA refers to (i) as “*Level A harassment*” (§3(18)(C)) and (ii) as “*Level B harassment*” (§3(18)(D)).



The Service has conducted intra-service programmatic section 7 consultations for the Chukchi and Beaufort Sea ITRs. These programmatic consultations provide incidental take authorization under the ESA. In most cases, the issuance of an LOA completes section 7 consultation requirements for other Federal agencies permitting the Action.

However, seismic surveys and exploratory drilling activities resulting from the first incremental step of the Action may continue after the current Beaufort and Chukchi ITRs expire. The prohibitions of the MMPA remain, and activities that result in incidental take of polar bears would not be legal until authorized under the MMPA. If and when authorization under the MMPA is requested the potential impacts to polar bears would be evaluated and take authorizations can only be issued if impacts will not result in more than negligible impacts to small numbers of polar bears from the Southern Beaufort Sea or Chukchi Sea stocks, which is a much stricter standard than jeopardizing the continued existence of a species.

In addition to LOAs, industry may also apply for intentional take authorizations. These authorizations, issued under sections 101(a)(4)(A), 109(h), and 112(c) of the MMPA allow the non-lethal harassment of polar bears to deter them from facilities to reduce the likelihood of death or injury of polar bears. These types of activity (considered Level B harassment) will only occur for:

1. The protection or welfare of the animal;
2. The protection of the public health and welfare; or
3. The non-lethal removal of nuisance animals.

Deterrence activities reduce the risk of polar bear mortality resulting from polar bear-human interactions. These deterrence activities are described under the MMPA as intentional take, although they are incidental to, and result from, other activities such as oil and gas exploration. Again, incidental take for deterrence activities cannot be issued under the ESA until it has been authorized under the MMPA. Section 7 consultation requirements are completed during the issuance of intentional take authorization for individual projects.

Although incidental take under the ESA is not provided in this BO, we have assessed potential impacts to polar bears to ensure activities that may result from the first incremental step of the Action do not jeopardize the continued existence of the species as required under section 7(a)(2) of the ESA. As described in Section 5 – *Effects of the Action*, activities that may result from the Action could adversely affect polar bears through disturbance, human-polar bear interactions, and spills of oil and toxic substances.

#### *Disturbance / Human-Polar Bear Interactions*

Seismic surveys and exploratory drilling activities may disturb mobile polar bears and cause minor changes in their behavior, displacing bears to undisturbed areas. These activities may also result in human-polar bear interactions leading to polar bear(s) being deterred away from Industry operations.

These types of activities have previously been conducted in the Beaufort and Chukchi seas and were permitted under the MMPA through the issuance of LOAs. As part of the LOA issuance, Industry is required to monitor and report all polar bear observations and interactions. Data from recent years can serve as the basis for our incidental take estimates for this consultation, and are summarized in Table 8.1.

**Table 8.1 – Number of polar bears observed by marine mammal observers during seismic survey and associated vessel activities in the Beaufort and Chukchi seas.**

Year	Beaufort Sea		Chukchi Sea	
	Length of Observation Lines	Number of Polar Bears Observed	Length of Observation Lines	Number of Polar Bears Observed
2006 <sup>1</sup>	5,145 km	4	26,029 km	4
2008 <sup>2</sup>	14,709 km	6	9,745 km	0

<sup>1</sup>Data from Funk et al. 2006 reporting for ConocoPhillips Alaska Inc., Shell Offshore Inc., and GX Technology.

<sup>2</sup>Data from Ireland et al. 2009 reporting for Shell Offshore Inc.

Using this data we anticipate that each seismic survey operation in the Beaufort or Chukchi Sea may encounter and possibly disturb  $\leq 5$  polar bears. However, the number of bears actually encountered by each survey will likely show considerable variation depending on the location of the survey (e.g., activities near the ice edge, or close to barrier islands will likely encounter more polar bears than those in open waters in summer in the southern Chukchi Sea).

The data in Table 8.1 is a sample and represents seismic survey activities only, and do not include any exploratory drilling activities. As described in Section 5 – *Effects of the Action*, although we have data from historical exploratory drilling activities, the sea ice conditions in the Program Areas have changed significantly since it was recorded. While ice conditions are dynamic and vary from year to year the numbers of polar bears encountered by those future operations may be lower than for past operations, particularly in low ice years. However, the data collected from exploratory drilling activities in the Chukchi Sea in 1989 and 1990 remains the best available data we have. Using this data we would similar levels of interaction between exploratory drilling vessels and polar bears in similar ice years; 18 bears were observed in 1989 and 25 in 1990 when 2 bears approached operations, 9 bears watched, 7 moved slowly away, and 5 ignored operations, and two bears did not have their responses recorded. Lower numbers of encounters and hence impacts are likely in lower ice years.

Observations also indicate that not all bears encountered respond to these types of activities. Even those which do respond are likely only affected by short term changes in their behavior as the vessel moves through the area. No injuries or lethal take are anticipated.

#### *Oil Spills and Toxic Contamination*

Although large spills are not reasonably expected to occur from activities in the first incremental step of the Action (MMS 2008), small spills of refined oil products are likely. If a polar bear contacts an oil spill or ingests oil it would likely be killed. However, spills from these types of activities are often extremely small in volume, are often into containment, and in the rare case

they do reach the environment are cleaned up. Based on these factors and the low density of polar bears in the Program Areas the Service does not anticipate any take of polar bears as a result of small spills, and in the unlikely situation that oil products reach the environment and is not cleaned up at most the death of a few individual bears may occur.

As spills are not an otherwise legal activity, no incidental take authorization is, or will be, provided for impacts from possible oil spills.

#### *Summary*

No lethal take is anticipated to occur as a result of the first incremental step of the Action. A small number of polar bears may be adversely affected through disturbance, and it is possible, although highly unlikely low numbers could be killed by a small oil spill. These adverse effects and mortality will impact only the Chukchi Sea and Southern Beaufort Sea polar bear stocks and population level impacts to the species are not anticipated.

## **9. REASONABLE AND PRUDENT MEASURES**

These reasonable and prudent measures (RPMs) and their implementing terms and conditions aim to minimize the incidental take anticipated for the first incremental step of the Action (seismic surveys and exploratory drilling). Additional RPMs will be developed and implemented during consultation on subsequent incremental steps in this project.

#### *Listed Eiders*

Activities authorized under the incremental step of seismic surveys and exploratory drilling may lead to incidental take of Steller's and spectacled eiders through collision mortality. As described in the Section 5 – *Effects of the Action* crude or refined oil or toxic substance spills that result in take of listed eiders are possible, and RPMs have been developed to minimize their effects. However, because spills are not an otherwise legal activity, no incidental take is authorized.

As part of the proposed Action MMS will require lease holders and operators to implement a series of stipulations and mitigation measures, including lighting protocols aimed at reducing collisions between seismic survey and exploratory drilling structures and listed eiders. These stipulations are provided as Appendix A of this BO.

In order to ensure the best available information is used in developing mitigation for listed species, MMS and their agents are required to:

- A. Work jointly with the Service to develop strategies to reduce light radiating from facilities, and provide the Service with an opportunity to review and provide comments on measures that will be, or have been taken to meet lighting objectives.
- B. Provide information on the effectiveness of aircraft and vessel exclusion areas aimed at protecting listed species, MMS must report to the Fairbanks Fish and Wildlife Field

Office any instances when aircraft have to fly below 1,500 feet over the LBCHU between July 1 and November 15 and over the spring lead system between April 1 and June 10, within 7 days of the activity occurring.

#### *Polar Bears*

As described in Section 5 – *Effects of the Action*, activities authorized in the first incremental step of this Action may adversely affect polar bears by disturbance, human-polar bear interactions, and spills. The magnitude of these effects is described in Section 8 – *Incidental Take Statement*, but no incidental take is authorized as under section 7 of the ESA incidental take of marine mammals cannot be provided until it is authorized under the MMPA.

- C. MMS must ensure lease holder or their agents obtain authorization under the MMPA for activities that may adversely affect polar bears.
- D. Work jointly with the Service to develop strategies to reduce potential impacts to polar bears, for example the development of polar bear interaction plans, protocols that will be implemented in the event of an oil spill that may reach areas where polar bears are present, and development of on-ice den detection methodologies and technologies.

## **10. TERMS AND CONDITIONS**

To be exempt from the prohibitions of Section 9 of the ESA, MMS and their agents must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are non-discretionary.

*RPM A – Work jointly with the Service to develop strategies to reduce light radiating from facilities and provide the Service with an opportunity to review and provide comments on measures that will be, or have been taken to meeting lighting objectives.*

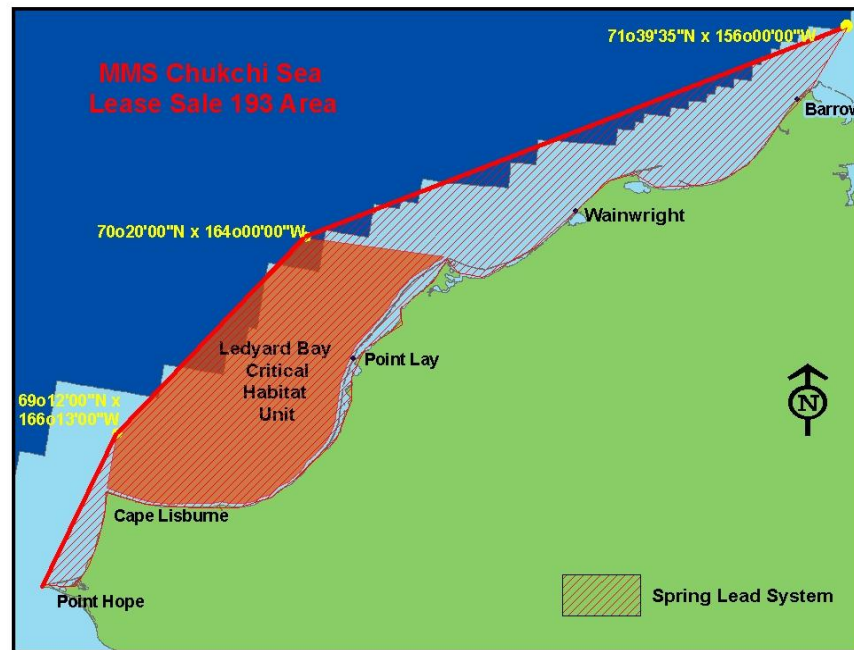
*RPM B - Provide information on the effectiveness of aircraft and vessel exclusion areas aimed at protecting listed species, MMS must report to the Fairbanks Fish and Wildlife Field Office any instances when aircraft have to fly below 1,500 feet over the LBCHU between July 1 and November 15 and over the spring lead system between April 1 and June 10, within 7 days of the activity occurring.*

For the purposes of these terms and conditions, the spring lead system is defined as the area landward of a line drawn from Point Hope to the corner of the LBCHU at 69°12'00"N x 166°13'00"W, to the corner of the LBCHU at 70°20'00"N x 164°00'00"W to 71°39'35"N x 156°00'00"W (Figure 10.1).

*RPM C – MMS must ensure lease holder or their agents obtain authorization under the MMPA for activities that may adversely affect polar bears.*

To ensure compliance with the MMPA, MMS must ensure lease holders or their agents obtain authorization for proposed activities under the MMPA. When authorization is provided under the MMPA, and if required, incidental take under the ESA will be issued concurrently.

RPM D - *Work jointly with the Service to develop strategies to reduce potential impacts to polar bears, including the development of polar bear interaction plans, and protocols that will be implemented in the event of an oil spill that may reach areas where polar bears are present.*



**Figure 10.1 – Spring lead system for purposes of terms and conditions**

## **11. CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

As described in Section 7 - *Conclusions*, under incremental consultation regulations (50 C.F.R. 402.14(k)), MMS is required to fulfill its continuing obligation to obtain sufficient data upon which to base the final biological opinion on the entire action. In addition to management-specific research needs, MMS is encouraged to support research that may provide information to strengthen our understanding of Steller's and spectacled eiders, polar bears, and candidate species, the reasons for their decline, and assist in focusing and conducting recovery efforts.

Further MMS and Industry can reduce potential impacts to listed species by:

- Avoid proposing infrastructure in important eider habitats, including the LBCHU, spring leads, nesting habitat near Barrow, areas with high density of nesting spectacled eiders in NPR-A, and areas where large number of polar bears are known to congregate (e.g. Barter and Cross Islands);
- Avoid proposing development in areas where spilled oil has a high risk of reaching the LBCHU, spring leads, or areas used by large numbers of polar bears (e.g., Barter and Cross Islands); and
- Improve technology to reduce the maximum amount of oil that can be spilled in marine areas, which has great bearing on potential risk to wildlife in marine areas.
- Work with the Service and other species experts to develop strategies that could be implemented to prevent oil contacting listed species in the event of a large marine spill.

In order for the Service to be kept informed of actions affecting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

## **12. REINITIATION NOTICE**

This concludes formal consultation on the Action described. This BO authorizes activities in the first incremental step (seismic surveys and exploratory drilling), and has considered the entire action as required under 50 C.F.R. 402.14(k). As provided in 50 C.F.R. 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and:

- 1) If the amount or extent of incidental take is exceeded;
- 2) If new information reveals effects of the action agency that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion;
- 3) If the agency action is subsequently modified in a manner that causes an effect to listed or critical habitat not considered in this opinion;
- 4) If a new species is listed or critical habitat designated that may be affected by the action;
- 5) Before authorization of the next incremental step in the action.

Thank you for your cooperation in the development of this BO. If you have any comments or require additional information, please contact Ted Swem, Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office, 101 12<sup>th</sup> Ave., Fairbanks, Alaska, 99701.

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## **Appendix A: Mitigation Measures for the Proposed Action (From MMS)**

### **Mitigation Measures**

#### **1. Existing Mitigation Measures**

##### **1.1. Mitigation Measures for the Polar Bear**

###### **1.1.1. Oil and Gas Activities on the Chukchi Sea OCS**

The mitigation measures in effect for ongoing activities in the Chukchi Sea as a result of Sale 193 can be found in the Chukchi Sea Sale 193 EIS (USDOL, MMS, 2007d), which can be found on the web at: [http://www.mms.gov/alaska/ref/EIS%20EA/Chukchi\\_FEIS\\_193/feis\\_193.htm](http://www.mms.gov/alaska/ref/EIS%20EA/Chukchi_FEIS_193/feis_193.htm)

The subset of these Stipulations, NTLs (notice to lessees) and ITLs (information to lessees) from Chukchi Sea Lease Sale 193 that most directly affect polar bears are reprinted here for the convenience of the reader:

Mitigation Measures Specific to the Lease-Sale Process for Sale 193.

Mitigation measures that are a standard part of the MMS program require seasonal windows for seismic operations; and require surveys to detect and avoid archaeological sites and biologically sensitive areas. Some MMS-identified mitigation measures are incorporated into OCS operations through cooperative agreements or efforts with industry and various State and Federal agencies.

**Stipulation No. 1 – Protection of Biological Resources.** If previously unidentified biological populations or habitats that may require additional protection are identified in the lease area by the Regional Supervisor, Field Operations (RS/FO), the RS/FO may require the lessee to conduct biological surveys to determine the OCS EIS/EA MMS 2007-026 MAY 2007 II-6 extent and composition of such biological populations or habitats. The RS/FO shall give written notification to the lessee of the RS/FO's decision to require such surveys. Based on any surveys that the RS/FO may require of the lessee or on other information available to the RS/FO on special biological resources, the RS/FO may require the lessee to:

- (1) Relocate the site of operations;
- (2) Establish to the satisfaction of the RS/FO, on the basis of a site-specific survey, either that such operations will not have a significant adverse effect upon the resource identified or that a special biological resource does not exist;
- (3) Operate during those periods of time, as established by the RS/FO, that do not adversely affect the biological resources; and/or
- (4) Modify operations to ensure that significant biological populations or habitats deserving protection are not adversely affected.

If any area of biological significance should be discovered during the conduct of any operations on the lease, the lessee shall immediately report such finding to the RS/FO and make every reasonable effort to preserve and protect the biological resource from damage until the RS/FO has given the lessee direction with respect to its protection. The lessee shall submit all data obtained in the course of biological surveys to the RS/FO with the locational information for

drilling or other activity. The lessee may take no action that might affect the biological populations or habitats surveyed until the RS/FO provides written directions to the lessee with regard to permissible actions.

Summary of the Effectiveness of Stipulation No. 1. The level of protection provided by this measure will depend on several factors: the size of population that might be subjected to adverse impacts and the number of individuals within the population that would be afforded protection by this stipulation; the overall size of habitat used by the resource of concern and the portion of that habitat that may be affected by offshore oil and gas operations; and the uniqueness of the population or habitat. Thus, the effectiveness of the stipulation could vary widely. If only a few members of a large population or a small amount of a large habitat area were to be affected by oil and gas operations, the mitigative benefits would be minimal. However, if many individuals of a small population or most of the area of unique habitat is protected and the adverse effects are reduced or minimized because of this stipulation, then its effectiveness could be substantial. This stipulation lowers the potential adverse effects to lower trophic level organisms, primarily unknown kelp communities, and other unique biological communities, that may be identified during oil and gas exploration or development activities and provided additional protection. It also would provide protection to fish habitat from potential disturbance associated with oil and gas exploration, development, and production. This stipulation does not change the level of impacts that may occur from a large oil spill.

**Stipulation No. 2 – Orientation Program.** The lessee shall include in any exploration or development and production plans submitted under 30 CFR 250.211 and 250.241 a proposed orientation program for all personnel involved in exploration or development and production activities (including personnel of the lessee’s agents, contractors, and subcontractors) for review and approval by the Regional Supervisor, Field Operations. The program shall be designed in sufficient detail to inform individuals working on the project of specific types of environmental, social, and cultural concerns that relate to the sale and adjacent areas. The program shall address the importance of not disturbing archaeological and biological resources and habitats, including endangered species, fisheries, bird colonies, and marine mammals and provide guidance on how to avoid disturbance. This guidance will include the production and distribution of information cards on endangered and/or threatened species in the sale area. The program shall be designed to increase the sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which such personnel will be operating. The orientation program shall also include information concerning avoidance of conflicts with subsistence activities and pertinent mitigation. The program shall be attended at least once a year by all personnel involved in onsite exploration or development and production activities (including personnel of the lessee’s agents, contractors, and subcontractors) and all supervisory and managerial personnel involved in lease activities of the lessee and its agents, contractors, and subcontractors. The lessee shall maintain a record of all personnel who attend the program onsite for so long as the site is active, not to exceed 5 years. This record shall include the name and date(s) of attendance of each attendee.

Summary of the Effectiveness of Stipulation No. 2. This stipulation provides positive mitigating effects by requiring that all personnel involved in petroleum activities on the North Slope resulting from any leases issued from Sale 193 be aware of the unique environmental, social, and

cultural values of the local Inupiat residents and their environment. This stipulation should help avoid damage or destruction of environmental, cultural, and archaeological resources through awareness and understanding of historical and cultural values. It also would help minimize potential conflicts between subsistence hunting and gathering activities and oil and gas activities that may occur. The extent of reduction offered by this stipulation is difficult to measure directly or indirectly. This stipulation provides protection to fish (including the migration of fish), pinnipeds, polar bears, bowhead whales, gray whales, and beluga whales from potential disturbances associated with oil and gas exploration, development, and production by increasing the awareness of workers to their surrounding environment. It increases the sensitivity to and understanding by workers of the values, customs, and lifestyles of Native communities and reduces the potential conflicts with subsistence resources and hunting activities. This stipulation does not change the level of impacts that may occur from a large oil spill.

#### **Stipulation No. 4 – Industry Site-Specific Monitoring Program for Marine Mammal Subsistence**

##### **Resources.**

A lessee proposing to conduct exploration operations, including ancillary seismic surveys on a lease, during the periods and within the subsistence use areas related to bowhead whale, beluga whale, ice seals, walrus, and polar bears and their migrations and subsistence hunting as specified below, will be required to conduct a site-specific monitoring program approved by the Regional Supervisor, Field Operations (RS/FO); unless, based on the size, timing, duration, and scope of the proposed operations, the RS/FO, in consultation with appropriate agencies and co-management organizations, determines that a monitoring program is not necessary.

Organizations currently recognized by the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (FWS) for the co-management of the marine mammals resources are the North Slope Borough, the Alaska Eskimo Whaling Commission, the Alaska Beluga Whale Committee, the Alaska Eskimo Walrus Commission, the Ice Seal Commission, and the Nanuk Commission. The RS/FO will provide the appropriate agencies and co-management organizations a minimum of 30 but no longer than 60 calendar days to review and comment on a proposed monitoring program prior to approval. The monitoring program must be approved each year before exploratory drilling operations can be commenced. The monitoring program will be designed to assess when bowhead and beluga whales, ice seals, walrus, and polar bears are present in the vicinity of lease operations and the extent of behavioral effects on these marine mammals due to these operations. In designing the program, the lessee must consider the potential scope and extent of effects that the type of operation could have on these marine mammals. Experiences relayed by subsistence hunters indicate that, depending on the type of operations some whales demonstrate avoidance behavior at distances of up to 35 mi. The program must also provide for the following:

- Recording and reporting information on sighting of the marine mammals of concern and the extent of behavioral effects due to operations;
- Coordinating the monitoring logistics beforehand with the MMS Bowhead Whale Aerial Survey Project (BWASP) and other mandated aerial monitoring programs;
- Invite a local representative to be determined by consensus of the appropriate co-management organizations to participate as an observer in the monitoring program;
- Submitting daily monitoring results to the RS/FO;

- Submitting a draft report on the results of the monitoring program to the RS/FO within 60 days following the completion of the operation. The RS/FO will distribute this draft report to the appropriate agencies and co-management organizations; and
- Submitting a final report on the results of the monitoring program to the RS/FO. The final report will include a discussion of the results of the peer review of the draft report. The RS/FO will distribute this report to the appropriate agencies and co-management organizations. The lessee will be required to fund an independent peer review of a proposed monitoring plan and the draft report on the results of the monitoring program for bowhead whales. The lessee may be required to fund an independent peer review of a proposed monitoring plan and the draft report on the results of the monitoring program for other co-managed marine mammal resources. This peer review will consist of independent reviewers who have knowledge and experience in statistics, monitoring marine mammal behavior, the type and extent of the proposed operations, and an awareness of traditional knowledge. The peer reviewers will be selected by the RS/FO from experts recommended by the appropriate agencies and co-management resource organizations. The results of these peer reviews will be provided to the RS/FO for consideration in final approval of the monitoring program and the final report, with copies to the appropriate agencies and co-management organizations.

In the event the lessee is seeking a Letter of Authorization (LOA) or Incidental Harassment Authorization (IHA) for incidental take from NMFS and/or FWS, the monitoring program and review process required under the LOA or IHA may satisfy the requirements of this stipulation. The lessee must advise the RS/FO when it is seeking an LOA or IHA in lieu of meeting the requirements of this stipulation and provide the RS/FO with copies of all pertinent submittals and resulting correspondence. The RS/FO will coordinate with the NMFS and/or FWS and will advise the lessee if the LOA or IHA will meet these requirements. The MMS, NMFS, and FWS will establish procedures to coordinate results from site-specific surveys required by this stipulation and the LOAs or IHAs to determine if further modification to lease operations are necessary. This stipulation applies to the areas and time periods listed below. This stipulation will remain in effect until termination or modification by the Department of the interior after consultation with appropriate agencies.

(Subsistence whaling and marine mammal hunting activities are by listed by community, see the Lease Sale 193 FEIS for more information on community subsistence hunting patterns, including polar bear.)

Summary of the Effectiveness of Stipulation No. 4. This stipulation provides site-specific information about the migration of bowhead whales and other marine mammals that could occur from oil and gas activities from the proposed lease sale. The information can be used to evaluate the threat of harm to the species and provides immediate information about the activities of bowhead whales, other marine mammals, and their response to specific events. This stipulation helps address NMFS concerns and recommendations to reduce potential effects to exploration activities. This stipulation also contributes incremental and important information to ongoing whale research and monitoring efforts and to the information database for bowhead whales. This stipulation helps reduce effects to subsistence-harvest patterns and to the overall sociocultural

systems that place special value to bowhead whale harvests and the traditional activities of sharing this harvest with the other members of the community. This stipulation helps provide mitigation to potential effects of oil and gas activities to the local Native whale hunters and subsistence users. It is considered to be a positive action by the Native community under environmental justice.

**Information to Lessees Clauses.** Information to Lessees (ITL) clauses 1 through 15 are standard and apply to OCS activities in the Chukchi Sea. The primary purpose of an ITL is to provide lessees with additional information related to mitigating potential adverse impacts from future oil and gas activities.

- No. 1 – Information on Community Participation in Operations Planning
- No. 2 – Information on Bird and Marine Mammal Protection
- No. 3 – Information on River Deltas
- No. 4 – Information on Endangered Whales and MMS Monitoring Program
- No. 5 – Information on the Availability of Bowhead Whales for Subsistence-Hunting Activities
- No. 6 – Information on High-Resolution Geological and Geophysical Survey Activity
- No. 7 – Information on the Spectacled Eider and Steller's Eider
- No. 8 – Information on Sensitive Areas to be Considered in Oil-Spill-Response Plans
- No. 9 – Information on Coastal Zone Management
- No. 10 – Information on Navigational Safety
- No. 11 – Information on Offshore Pipelines
- No. 12 – Information on Discharge of Produced Waters
- No. 13 – Information on Use of Existing Pads and Islands
- No. 14 – Information on Planning for Protection of Polar Bears
- No. 15 – Possible listing of Polar Bear under ESA
- No. 16 – Archaeological and Geological Hazards Reports and Surveys
- No. 17 – Response Plans for Facilities Located Seaward of the Coast Line
- No. 18 – Oil Spill Financial Responsibility for Offshore Facilities
- No. 19 – Good Neighbor Policy
- No. 20 – Rentals/Minimum Royalties and Royalty Suspension Provisions
- No. 21 – MMS Inspection and Enforcement of Certain Coast Guard Regulations
- No. 22 – Statement Regarding Certain Geophysical Data
- No. 23 – Affirmative Action Requirements
- No. 24 – Bonding Requirements

**No. 1 - Information on Community Participation in Operations Planning.** Lessees are encouraged to bring one or more residents of communities in the area of operations into their planning process. Local communities often have the best understanding of how oil and gas activities can be conducted safely in and around their area without harming the environment or interfering with community activities. Involving local community residents in the earliest stages of the planning process for proposed oil and gas activities can be beneficial to the industry and the community. Community representation on management teams, developing plans of operation, oil-spill response plans, and other permit applications can help communities understand permitting obligations and help the industry to understand community values and expectations for oil and gas operations being conducted in and around their area.

**No. 2 - Information on Bird and Marine Mammal Protection.** Lessees are advised that during the

conduct of all activities related to leases issued as a result of this sale, the lessee and its agents, contractors, and subcontractors will be subject to the provisions of the following laws, among others: the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 U.S.C. 1361 et seq.); the Endangered Species Act (ESA), as amended (16 U.S.C. 1531 et seq.); and applicable International Treaties. Lessees and their contractors should be aware that disturbance of wildlife could be determined to constitute harm or harassment and thereby be in violation of existing laws and treaties. With respect to endangered species and marine mammals, disturbance could be determined to constitute a “taking” situation. Under the ESA, the term “take” is defined to mean “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Under the MMPA, “take” means “harass, hunt, capture, collect, or kill or attempt to harass, hunt, capture, or kill any marine mammal.” Violations under these Acts and applicable Treaties will be reported to National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (FWS), as appropriate. Incidental taking of marine mammals and endangered and threatened species is allowed only when the statutory requirements of the MMPA, the ESA, or both, depending on the species that is taken, are met. Section 101(a)(5) of the MMPA, as amended, (16 U.S.C. 1371(a)(5)) provides a mechanism for allowing, upon request and during periods of not more than 5 consecutive years each, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographic region, provided that NMFS or FWS finds that the total of such taking during each 5-year (or less) period would have no more than a negligible impact on such species or stock and will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses.

Applicants can receive authorization to incidentally, but not intentionally, take marine mammals under the MMPA through two types of processes: the Letter of Authorization (LOA) process and the Incidental Harassment Authorization (IHA) process. In either case, under the MMPA, incidental take of marine mammals is prohibited unless authorization is obtained by those proposing the activity, whether or not the marine mammals are endangered or threatened.

Lessees are advised that, if marine mammals may be taken by harassment, injury, or mortality as a result of exploration activities, specific regulations and LOAs must be applied for and in place or IHAs must be obtained by those proposing the activity in order to allow the incidental take of marine mammals whether or not they are endangered or threatened. The regulatory process may require 1 year or longer; the IHA process takes about 5 months after receipt of a complete application. Based on guidance from the National Oceanographic and Atmospheric Administration (NOAA) Fisheries’ Office of Protected Resources web site, if the applicant can show that: (a) there is no potential for serious injury or mortality; or, (b) the potential for serious injury or mortality can be negated through mitigation requirements that could be required under the authorization, the applicant should apply for an IHA and does not need an LOA for the activity. If the potential for serious injury and/or mortalities exists and no mitigating measures are available to prevent this form of ‘take’ from occurring, to receive authorization for the take, the applicant must obtain an LOA. The LOA requires that regulations be promulgated and



published in the Federal Register outlining: (a) permissible methods and the specified geographical region of taking; (b) the means of effecting the least practicable adverse impact on the species or stock and its habitat and on the availability of the species or stock for subsistence uses; and c) requirements for monitoring and reporting, including requirements for the independent peer review of proposed monitoring plans where the proposed activity may affect the availability of a species or stock for taking for subsistence uses. Under the MMPA, of those marine mammal species that occur in Alaskan waters, NMFS is responsible for species of the order Cetacea (whales and dolphins) and the suborder Pinnipedia (seals and sea lions) except walruses; FWS is responsible for polar bears, sea otters, and walruses. Requests for Incidental Take Authorizations (ITAs) should be directed towards the appropriate agency. Procedural regulations implementing the provisions of the MMPA are found at 50 CFR Part 18.27 for the FWS and at 50 CFR Part 216 for NMFS. If an applicant is requesting authorization for the incidental, but not intentional taking, of a marine mammal that is the responsibility of NMFS, a written request must be submitted to the NOAA Fisheries Office of Protected Resources and the appropriate NMFS Regional Office where the specified activity is planned. If an applicant is requesting authorization for the incidental, but not intentional, taking of a marine mammal that is the responsibility of FWS, a written request must be submitted to the FWS Regional Office where the specific activity is planned. More information on this process, and application materials, are available from the NOAA Fisheries Office of Protected Resources website ([www.nmfs.noaa.gov/prot\\_res/PR2/Small\\_Take/smalltake.info.htm](http://www.nmfs.noaa.gov/prot_res/PR2/Small_Take/smalltake.info.htm)).

According to NOAA Fisheries Small Take web site, most LOAs and IHAs to date have involved the incidental harassment of marine mammals by noise. Activities with the greatest potential to harass by noise include seismic airguns, ship and aircraft noise, high-energy sonar, and explosives detonations. Please note that the NOAA Fisheries web site on small-take authorizations indicates the following timetables for LOA and IHA decisions: “Decisions on LOA applications (includes two comment periods, possible public hearings and consultations) may take from 6-12 months. The IHA decisions normally involve one comment period and, depending on the issues and species involved, can take anywhere from 2- 6 months” ([www.nmfs.noaa.gov/prot\\_res/PR2/Small\\_Take/smalltake\\_info.htm#applications](http://www.nmfs.noaa.gov/prot_res/PR2/Small_Take/smalltake_info.htm#applications)). Section 7(b)(4) of the ESA allows for the incidental taking of endangered and threatened species under certain circumstances. If a marine mammal species is listed as endangered or threatened under the ESA, the requirements of both the MMPA and the ESA must be met before the incidental take can be allowed. Of particular concern is disturbance at major wildlife-concentration areas, including bird colonies, marine mammal haulout and breeding areas, and wildlife refuges and parks. Maps depicting major wildlife concentration areas in the lease area are available from the MMS Regional Supervisor, Field Operations. Lessees also are encouraged to confer with FWS and NMFS in planning transportation routes between support bases and lease holdings. Lessees also should exercise particular caution when operating in the vicinity of species that are not listed under the ESA but are proposed for listing, designated as candidates for listing, or are listed as a “Species of Concern” or whose populations are believed to be in decline, such as the yellow-billed loon, walrus, and polar bear. Generally, behavioral disturbance of most birds and mammals found in or near the sale area would be unlikely if aircraft and vessels maintain at least a 1-mile horizontal distance and aircraft maintain at least a 1,500-foot (ft) vertical distance above known or observed wildlife-concentration areas, such as seabird

colonies, the spring lead system, and marine mammal haulout and breeding areas. For the protection of endangered whales and marine mammals throughout the lease area, MMS recommends that all aircraft operators maintain a minimum 1,500-ft altitude when in transit between support bases and exploration sites. The MMS encourages lessees and their contractors to minimize or reroute trips to and from the leasehold by aircraft and vessels when endangered whales are likely to be in the area. Human safety will take precedence at all times over these recommendations.

**No. 6 - Information on Seismic Survey Activity.** Lessees are advised of the potential effect of geophysical activity to bowhead whales, other marine mammals, and subsistence hunting activities. High resolution seismic surveys are distinguished from 2D/3D seismic surveys by the magnitude of the energy source used in the survey, the size of the survey area, the number and length of arrays used, and duration of the survey period. High-resolution seismic surveys are typically conducted after a lease sale in association with a specific exploration or development program or in anticipation of future lease sale activity. Lessees are advised that all seismic survey activity conducted in Chukchi Sea Planning Area, either under the geological and geophysical (G&G) permit regulations at 30 CFR 251 or as an ancillary activity in support of an exploration plan or development and production plan under 30 CFR 250, is subject to environmental and regulatory review by the MMS. The MMS has standard mitigating measures that apply to these activities, and lessees are encouraged to review these measures before developing their applications for G&G permits or planning ancillary activities on a lease. Copies of the nonproprietary portions of all G&G permits applications will be provided by MMS to appropriate agencies, co-management organizations, and directly affected communities. Organizations currently recognized by the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (FWS) for the co-management of the marine mammals resources are the North Slope Borough, the Alaska Eskimo Whaling Commission, the Alaska Beluga Whale Committee, the Alaska Eskimo Walrus Commission, and the Nanuk Commission. The MMS may impose restrictions (including the timing of operations relative to open water) and other requirements (such as having a locally approved coordinator on board) on seismic surveys to minimize unreasonable conflicts between the seismic survey activities and subsistence whaling activities.

Lessees and applicants are advised that MMS will require any proposed seismic activities to be coordinated with the appropriate agencies, co-management organizations, and directly affected subsistence communities to identify potential conflicts and develop plans to avoid these conflicts. Copies of the results of any required monitoring plans will be provided by MMS to the NSB, directly affected subsistence communities, and appropriate agencies and subsistence organizations for comment.

**No. 8 - Information on Sensitive Areas to be Considered in the Oil-Spill Response Plans (OSRP).**

Lessees are advised that certain areas are especially valuable for their concentrations of marine birds, marine mammals, fishes, other biological resources, or cultural resources, and for their importance to subsistence harvest activities, and should be considered when developing OSRPs. Coastal aggregations of polar bears during the open water/broken-ice period are particularly

vulnerable to the effects of an oil spill, which lessees must account for in their OSRPs. Identified areas and time periods of special biological and cultural sensitivity for the Chukchi Sea include:

- 1) Elson Lagoon;
- 2) Barrow Polar Bear Aggregation Area, August-October;
- 3) Spring Lead System April-June;
- 4) Peard Bay/Franklin Spit;
- 5) Kuk Lagoon;
- 6) Icy Cape and associated Barrier Islands;
- 7) Kasegaluk Lagoon and Naokok, Kukpowruk, Akunik, and Utukok Passes through the Barrier Islands;
- 8) Ledyard Bay Critical Habitat Area;
- 9) Cape Lisburne, May-September;
- 10) Marryat Inlet;
- 11) Cape Thompson, May-September;
- 12) On-and offshore waters from Point Hope to Cape Thompson, including Aiautak and Akoviknak Lagoons;
- 13) Kugrua River, May-October;
- 14) Kuchiak River, Jan-Dec;
- 15) Kuk River, May-October;
- 16) Kokolik River, May-October;
- 17) Kukpowruk River, May-October;
- 18) Pitmegea River, May-October; and
- 19) Utukok River, May-October.

These areas are among areas of special economic or environmental importance required by 30 CFR 254.26 to be considered in the OSRP. Lessees are advised that they have the primary responsibility for identifying these areas in their OSRPs and for providing specific protective measures. Additional areas of special economic or environmental importance may be identified during review of exploration plans and development and production plans. Industry should consult with U.S. Fish and Wildlife Service or State of Alaska personnel to identify specific environmentally sensitive areas within National Wildlife Refuges or state special areas which should be considered when developing a project-specific OSRP. Consideration should be given in an OSRP as to whether use of dispersants is an appropriate defense in the vicinity of an area of economic or environmental importance. Lessees are advised that prior approval must be obtained before dispersants are used.

**No. 14 - Information on Planning for Protection of Polar Bears.** Polar bears are part of a dynamic rather than a static system. Changes in their distributions and populations in recent years indicate that adaptive management is required to adequately mitigate potential impacts to their populations (i.e., specific mitigation measures developed today may not be applicable 5, 10, or 20 years from now). The U.S. Fish and Wildlife Service (FWS) is the management agency responsible for polar bear management; as such, they have the most current information about the status of polar bear populations, the issues facing them, and the most recent research findings applicable to them. Therefore, MMS will be implementing increased coordination with FWS for

the protection of polar bears. Lessees are advised to consult with FWS and local Native communities while planning their activities and before submission of their Oil-Spill Response Plans (OSRP) to ensure potential threats to polar bears are adequately addressed based on the most current knowledge regarding their habitat use, distribution, and population status, and to ensure adequate geographic coverage and protection are provided under the OSRP. Coastal aggregations of polar bears during the open water/broken ice period are particularly vulnerable to the effects of an oil spill, which lessees must address in their OSRPs. For example, well known polar bear aggregations have occurred at Point Barrow in close proximity to subsistence-harvested whale carcass remains. Measures to ensure adequate timely geographic coverage and protection of polar bears may include, but are not limited to, the pre-staging of oil-spill equipment at or near locations of polar bear aggregation to support oil-spill-response operations. Lessees are encouraged to consult and coordinate with FWS, local Native communities, and the Nanuk Commission to develop plans and mitigation strategies in their OSRP to prevent adverse effects to known bear aggregations. Making subsistence harvested whale carcasses unavailable to polar bears on land during the fall open-water period may reduce polar bear aggregations and thus lower the potential for an oil spill to impact polar bears. As part of the MMS review of proposed activities and mitigation measures, the Regional Supervisor, Field Operations (RS/FO) will notify FWS of the review of proposed Exploration Plans and Development and Production Plans (and associated OSRP) and make copies of these documents available to FWS for review and comment. Lessees are encouraged to continue existing or initiate new training programs for oil-spill-response teams in local villages to facilitate local participation in spill response and cleanup. This effort allows local Native communities to use their knowledge about sea ice and the environment in the response process and can enhance their ability to provide protection to key resources, including polar bears. Under the Marine Mammal Protection Act (MMPA), the incidental take of marine mammals is prohibited unless authorization is obtained by those proposing the activity, whether or not the marine mammals are endangered or threatened. To protect polar bears and other marine mammals, MMS encourages OCS operators to obtain an incidental take authorization (ITA) from FWS under the MMPA prior to any operation. Incidental takes of polar bears are allowed only if an ITA is obtained from the FWS pursuant to the regulations in effect at the time. Obtaining an ITA will ensure that lessees' operations are planned and conducted with the most current knowledge of polar bears' habitat use, distribution, and population status. The FWS must be in receipt of a petition for incidental take prior to initiating the regulatory process. An ITA must be requested annually. Lessees are advised that polar bears may be present in the area of operations, particularly during the solid ice period. Lessees should conduct their activities in a way that will limit potential encounters and interaction between lease operations and polar bears. Lessees are advised to contact FWS regarding proposed operations and actions that might be taken to minimize interactions with polar bears. Lessees also are advised to consult OCS Study MMS 93-0008, Guidelines for Oil and Gas Operations in Polar Bear Habitats. Lessees are reminded of the provisions of the 30 CFR 250.300 regulations, which prohibit unauthorized discharges of pollutants into offshore waters. Trash, waste, or other debris that might attract polar bears or might be harmful to polar bears should be properly stored and disposed of to minimize attraction of, or encounters with, polar bears.

**No. 15 – Possible listing of Polar Bear under ESA.** Lessees are advised that the U.S. Fish and Wildlife Service is proposing to list the polar bear (*Ursus maritimus*) as a threatened species under the Endangered Species Act and has initiated a comprehensive scientific review to assess the current status and future of the species. During 2007, the FWS will gather more information, undertaking additional analyses, and assessing the reliability of relevant scientific models before making final decision whether to list the species. Please refer to <http://alaska.fws.gov/fisheries/mmm/polarbears/issues.htm> for additional information. If the polar bears are ultimately listed under the ESA, then MMS will consult with FWS under Section 7 of the ESA, and may be required to apply additional mitigation measures on OCS activities to ensure appropriate protection.

#### **II.B.4. Mitigation Measures for Seismic Operations in the Chukchi Sea.**

The following stipulations are standard for MMS-permitted geological and geophysical (G&G) activities and would be included for all seismic activities considered. On-lease, ancillary seismic activities would use a selected suite of these mitigation measures that are appropriate for the specific operation:

1. No solid or liquid explosives shall be used without specific approval.
2. Operations shall be conducted in a manner to ensure that they will not cause pollution, cause undue harm to aquatic life, create hazardous or unsafe conditions, or unreasonably interfere with other uses of the area. Any difficulty encountered with other uses of the area or any conditions that cause undue harm to aquatic life, pollution, or could create a hazardous or unsafe condition as a result of the operations under this permit shall be reported to the Regional Supervisor/Resource Evaluation. Serious or emergency conditions shall be reported without delay.
3. Operators must maintain a minimum spacing of 15 miles between the seismic-source vessels for separate simultaneous operations. The MMS must be notified by means of the weekly report whenever a shut down of operations occurs in order to maintain this minimum spacing.
4. Permit applicants shall use the lowest sound levels feasible to accomplish their data-collection needs.

##### **II.B.4.a. Measures to Mitigate Seismic-Surveying Effects.**

The measures outlined below are based on the protective measures in MMS' most recent marine seismic survey exploration permits and the MMS' Biological Evaluation for ESA Section 7 consultation with NMFS on Arctic Region OCS activities dated March 3, 2006 (USDOl, MMS, 2006b), recent Section 7 consultations with the USFWS regarding threatened eiders, and the recently completed Programmatic Environmental Assessment of Arctic Ocean Outer Continental Shelf Seismic Surveys – 2006 (USDOl, MMS, 2006a). The protective measures (e.g., ramp up) also are accepted by the scientific community and the resource agencies (e.g., NMFS and FWS). Although not empirically proven, anecdotal evidence on the displacement of marine mammals by sounds (e.g., those sounds generated by ramp up) and professional reasoning indicate that they are reasonable mitigation measures to implement.

1. Exclusion Zone – A 180/190-decibel (dB) isopleth-exclusion zone (also called a shutdown zone) from the seismic-survey-sound source shall be free of marine mammals before the survey can begin and must remain free of mammals during the survey. The purpose of the exclusion

zone is to protect marine mammals from Level A harassment (injury/harm). The 180-dB (Level A harassment-injury) applies to cetaceans and the Pacific walrus, and the 190-dB (Level A harassment-injury) applies to pinnipeds other than the Pacific walrus and to polar bears.

2. Monitoring of the Exclusion Zone – Individuals (marine mammal biologists or trained observers) shall monitor the area around the survey for the presence of marine mammals to maintain a marine mammal-free exclusion zone and monitor for avoidance or take behaviors. Visual observers monitor the exclusion zone to ensure that marine mammals do not enter the exclusion zone for at least 30 minutes prior to ramp up, during the conduct of the survey, or before resuming seismic survey work after shut down. The NMFS will set specific requirements for the monitoring programs and observers.

3. Shut Down – The survey shall be suspended until the exclusion zone is free of marine mammals. All observers shall have the authority to, and will, instruct the vessel operators to immediately stop or de-energize the airgun array whenever a marine mammal is seen within the exclusion zone. If the airgun array is completely powered down for any reason during nighttime or poor sighting conditions, it shall not be re-energized until daylight or whenever sighting conditions allow for the exclusion zone to be effectively monitored from the source vessel and/or through other passive acoustic, aerial, or vessel-based monitoring.

4. Ramp Up – Ramp up is the gradual introduction of sound to deter marine mammals (and other fish and wildlife) from potentially damaging sound intensities and from approaching the exclusion zone. This technique involves the gradual increase (usually 5-6 dB per 5-minute increment) in emitted sound levels, beginning with firing a single airgun and gradually adding airguns over a period of at least 20-40 minutes, until the desired operating level of the full array is obtained. Ramp-up procedures may begin after observers ensure the absence of marine mammals for at least 30 minutes. Ramp-up procedures shall not be initiated at night or when monitoring the exclusion zone is not possible. A single airgun operating at a minimum source level can be maintained for routine activities, such as making a turn between line transects, for maintenance needs or during periods of impaired visibility (e.g., darkness, fog, high sea states), and does not require a 30- minute clearance of the exclusion zone before the airgun array is again ramped up to full output.

5. Field Verification – Before conducting the survey, the operator shall verify the radii of the exclusion zones within real-time conditions in the field. This provides for more accurate exclusion-zone radii rather than relying on modeling techniques before entering the field. Field verification techniques must be consistent with NMFS-approved guidelines and procedures. When moving a seismic-survey operation into a new area, the operator shall verify the new radii of the exclusion zones by applying a sound-propagation series.

6. Monitoring of the Seismic-Survey Area – Aerial-monitoring surveys or an equivalent monitoring program acceptable to the NMFS may be required.

7. Reporting Requirements – Reporting requirements, such as the monitoring plans required by FWS for polar bears and walruses prior to the start of seismic activities, provide the regulating

agencies with specific information on the monitoring techniques to be implemented and how any observed impacts to marine mammals will be recorded. In addition, operators must report immediately any shut downs due to a marine mammal entering the exclusion zones and provide the regulating agencies with information on the frequency of occurrence and the types and behaviors of marine mammals (if possible to ascertain) entering the exclusion zones.

8. Temporal/Spatial/Operational Restrictions – Dynamic management approaches to avoid or minimize exposure, such as temporal or spatial limitations are based on marine mammals or birds being present in a particular place or time, or being engaged in a particularly sensitive behavior (such as feeding).

- • Seismic surveys must not occur in the Chukchi Sea spring lead system before July 1 of each year, unless authorized by NMFS, to provide bowhead cow/calf pairs additional protection.
- Operators are required to provide information regarding their operations within the spring lead system upon request of MMS. The MMS may request information regarding number of vessels and their dates/points of entry into and exit from the spring lead system.
- • No seismic vessel activity, including resupply vessels and other related traffic, will be permitted within the Ledyard Bay Critical Habitat Area after July 1 of each year, unless human health or safety dictates otherwise. Incursions for human health or safety purposes shall be reported within 24 hours to MMS. Other incursions will be considered noncompliance with this condition.
- • Survey-support aircraft will avoid flying over the Ledyard Bay Critical Habitat Area below an altitude of 1,500 feet (450 meters) after July 1 of each year, unless human health or safety dictates otherwise. Incursions for human health or safety purposes shall be reported within 24 hours to MMS. Other incursions will be considered noncompliance with this condition. In other coastal areas, seismic-survey-support aircraft should maintain at least 1,500 ft (450 m) over beaches, lagoons, and nearshore waters as much as possible.
- • Seismic-survey and support vessels will minimize operations that require high-intensity work lights, especially within the 20-m bathymetric contour. High-intensity lights will be turned off in inclement weather when a vessel is not actively participating in seismic surveys; however, navigation lights, deck lights, and interior lights could remain on for safety.

#### **1.1.1.2 Oil and Gas Activities on the Beaufort Sea OCS**

The mitigation measures in effect for ongoing OCS activities that result from previous Beaufort Sea sales can be found in USDOJ, MMS (2003a) and at [www.mms.gov/alaska/ref/EIS%20EA/BeaufortMultiSaleFEIS186\\_195\\_202/2003\\_001vol1.pdf](http://www.mms.gov/alaska/ref/EIS%20EA/BeaufortMultiSaleFEIS186_195_202/2003_001vol1.pdf). These mitigation measures include stipulations that have mitigation effects for polar bears, and standard stipulations that were primarily designed to protect other species, but which also mitigate effects for polar bears. The portions of these stipulations that mitigate potential effects to polar bears are briefly described below:

#### **Protection of Biological Resources.**

If biological populations or habitats that require additional protection are identified in the lease area by the MMS Regional Supervisor, Field Operations (RS/FO), the RS/FO may require the lessee to conduct biological surveys to determine the extent and composition of such biological populations or habitats. Based on any surveys that the RS/FO may require of the lessee or on other information available to the RS/FO on special biological resources, the RS/FO may require the lessee to:

- (1) Relocate the site of operations;
- (2) Establish to the satisfaction of the RS/FO, on the basis of a site-specific survey, either that such operations will not have a significant adverse effect on the resource identified or that a special biological resource does not exist;
- (3) Operate during those periods of time, as established by the RS/FO, that do not adversely affect the biological resources; and/or
- (4) Modify operations to ensure that significant biological populations or habitats deserving protection are not adversely affected. If any area of biological significance should be discovered during the conduct of any operations on the lease, the lessee shall immediately report such findings to the RS/FO and make every reasonable effort to preserve and protect the biological resource from damage until the RS/FO has given the lessee direction with respect to its protection. The lessee shall submit all data obtained in the course of biological surveys to the RS/FO with the location information for drilling or other activity. The lessee may take no action that might affect the biological populations or habitats surveyed until the RS/FO provides written directions to the lessee regarding permissible actions.

#### **Orientation Program.**

The lessee shall include in any exploration or development and production plans a proposed orientation program for all personnel. The program shall be designed in sufficient detail to inform individuals working on the project of specific types of environmental, social, and cultural concerns that relate to the sale and adjacent areas. The program shall address the importance of not disturbing biological resources and habitats, including endangered species and marine mammals and provide guidance on how to avoid disturbance. This guidance will include the production and distribution of information cards on endangered and/or threatened species in the sale area. The program



shall be attended at least once a year by all personnel. The MMS and FWS have published guidelines for oil and gas operations in polar bear habitats that describe further measures to reduce potential impacts to polar bears. This includes properly storing food, trash and any liquid products (antifreeze, diesel, paint, etc.) so that they are inaccessible to bears and do not act as an attractant; properly designing and lighting facilities and temporary camps so that they do not encourage bears to approach and the risk of bear-human interactions are minimized.

**Industry Site-Specific Bowhead Whale-Monitoring Program.**

Lessees proposing to conduct exploratory drilling operations, including seismic surveys, during the bowhead whale migration will be required to conduct a site-specific monitoring program. The program must also provide for the following: recording and reporting information on sighting of other marine mammals and the extent of behavioral effects due to operations. During seismic operations, operators are required to ramp up gradually which presumably gives marine mammals time to move away from the zones of influence. Operators are also required to have marine mammal observers on watch at all times while operating, and to shut down if marine mammals are seen within zones of influence (190 dB for polar bears and ice seals, 180dB for cetaceans and Pacific walrus.)

**Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Subsistence Activities.**

Exploration and development and production operations shall be conducted in a manner that prevents unreasonable conflicts between the oil and gas industry and subsistence activities (including, but not limited to, bowhead whale subsistence hunting).

The lessee shall make every reasonable effort to assure that exploration, development, and production activities are compatible with whaling and other subsistence hunting activities and will not result in unreasonable interference with subsistence harvests. Lease-related use will be restricted when the RS/FO determines it is necessary to prevent unreasonable conflicts with local subsistence hunting activities. In enforcing this stipulation, the RS/FO will work with other agencies and the public to assure that potential conflicts are identified and efforts are taken to avoid these conflicts. Subsistence whaling activities occur generally during the following periods:

August to October: Kaktovik whalers use the area circumscribed from Anderson Point in Camden Bay to a point 30 kilometers north of Barter Island to Humphrey Point east of Barter Island. Nuiqsut whalers use an area extending from a line northward of the Nechelik Channel of the Colville River to Flaxman Island, seaward of the Barrier Islands.

September to October: Barrow hunters use the area circumscribed by a western boundary extending approximately 15 kilometers west of Barrow, a northern boundary 50 kilometers north of Barrow, then southeastward to a point about 50 kilometers off Cooper Island, with an eastern boundary on the east side of Dease Inlet. Occasional use may extend eastward as far as Cape Halkett.

The time periods identified above coincide with when polar bears come ashore in these areas. Protective measures identified to reduce conflicts with subsistence whaling also reduce potential conflicts with polar bear movements in these areas.

In addition, some of the standard information to lessee clauses provide guidance on mitigation measures for polar bears. These clauses, which apply to OCS activities in the Beaufort Sea, include the following:

**Information on Bird and Marine Mammal Protection.**

Lessees are advised that during the conduct of all activities related to leases issued as a result of this sale, the lessee and its agents, contractors, and subcontractors will be subject to the provisions of the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 U.S.C. 1361 et seq.); the Endangered Species Act (ESA), as amended (16 U.S.C. 1531 et seq.); and applicable International Treaties. Lessees and their contractors should be aware that disturbance of wildlife could be determined to constitute harm or harassment and, thereby, be in violation of existing laws and treaties. With respect to endangered species and marine mammals, disturbance could be determined to constitute a “taking” situation. Under the ESA, the term “take” is defined to mean “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Under the MMPA, “take” means “harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal.” These Acts and applicable Treaties require violations be reported to the NMFS or the FWS, as appropriate.

Incidental taking of marine mammals and endangered and threatened species is allowed only when the statutory requirements of the MMPA and/or the ESA are met. Section 101(a)(5) of the MMPA (16 U.S.C. 1371(a)(5)) allows for the taking of small numbers of marine mammals incidental to a specified activity within a specified geographical area. Section 7(b)(4) of the ESA (16 U.S.C. 1536(b)(4)) allows for the incidental taking of endangered and threatened species under certain circumstances. If a marine mammal species is listed as endangered or threatened under the ESA, the requirements of both the MMPA and the ESA must be met before the incidental take can be allowed.

Under the MMPA and ESA, the NMFS is responsible for species of the order Cetacea (whales and dolphins) and the suborder Pinnipedia (seals and sea lions) except walrus; the FWS is responsible for polar bears, sea otters, walrus, and birds. Procedural regulations implementing the provisions of the MMPA are found at 50 CFR Part 18.27 for FWS, and at 50 CFR Part 228 for NMFS.

Lessees are advised that specific regulations must be applied for and in place and that a Letter of Authorization (LOA) or Incidental Harassment Authorization (IHA) must be obtained by those proposing the activity to allow the incidental take of marine mammals, whether or not they are endangered or threatened. The regulatory process may require 1 year or longer. Of particular concern is disturbance at major wildlife concentration areas, including bird colonies, marine mammal haulout and breeding areas, and wildlife refuges and parks. Maps depicting major wildlife concentration areas in the lease area are

available from the RS/FO. Lessees also are encouraged to confer with the FWS and NMFS in planning transportation routes between support bases and lease holdings.

Lessees should exercise particular caution when operating in the vicinity of species whose populations are known or thought to be declining and which are not protected under the ESA; such as, Pacific walrus. These regulations have been extended until August 2, 2011 (71 FR 43925).

Incidental take regulations are promulgated only upon request, and the FWS must be in receipt of a petition prior to initiating the regulatory process. Incidental, but not intentional, taking is authorized only by U.S. citizens holding an LOA issued pursuant to these regulations. An LOA or IHA must be requested annually. Behavioral disturbance of most birds and mammals found in or near the lease area would be unlikely if aircraft and vessels maintain at least a 1-mile horizontal distance and aircraft maintain at least a 1,500-foot vertical distance above known or observed wildlife concentration areas, such as bird colonies and marine mammal haulout and breeding areas. For the protection of endangered whales and marine mammals throughout the lease area, it is recommended that all aircraft operators maintain a minimum 1,500-foot altitude when in transit between support bases and exploration sites. Lessees and their contractors are encouraged to minimize or reroute trips to and from the leasehold by aircraft and vessels when endangered whales are likely to be in the area. Human safety will take precedence at all times over these recommendations. The current Beaufort Sea Incidental Take Regulations for polar bear include mitigation, monitoring and reporting requirements for operators. Each request for an LOA is carefully reviewed by the FWS, and LOAs may include conditions to afford additional protections to sensitive areas, such as denning habitats.

#### **Information on Polar Bear Interaction.**

Lessees are advised that polar bears may be present in the area of operations, particularly during the solid-ice period. Lessees should conduct their activities in a manner which will limit potential encounters and interaction between lease operations and polar bears. The FWS is responsible for the protection of polar bears under the provisions of the MMPA of 1972, as amended. Lessees are advised to contact the FWS regarding proposed operations and actions that might be taken to minimize interactions with polar bears. Lessees also are advised to consult “OCS Study MMS 93-0008, Guidelines for Oil and Gas Operations in Polar Bear Habitats.”

The FWS must be in receipt of a petition for incidental take prior to initiating the regulatory process. Incidental takes of polar bears are allowed only if an LOA or an IHA is obtained from the FWS pursuant to the regulations in effect at the time. An LOA or an IHA must be requested annually. Lessees are reminded of the provisions of the 30 CFR 250.300 regulations which prohibit discharges of pollutants into offshore waters. Trash, waste, or other debris which might attract polar bears or be harmful to polar bears should be properly stored and disposed of to minimize attraction of, or encounters with, polar bears.

### **Information on Sensitive Areas to be Considered in the Oil-Spill Contingency Plans (OSCP)**

Lessees are advised that certain areas are especially valuable for their concentrations of marine birds, marine mammals, fishes, other biological resources, or cultural resources, and for their importance to subsistence-harvest activities, and should be considered when developing OSCP. Identified areas and time periods of special biological and cultural sensitivity include:

- (1) the lead system off Point Barrow, April-June;
- (2) the saltmarshes from Kogru Inlet to Smith Bay, June-September;
- (3) the Plover Islands, June-September;
- (4) the Boulder Patch in Stefansson Sound, June-October;
- (5) the Camden Bay area (especially the Nuvugag and Kaninniivik hunting sites), January, April-September, November;
- (6) the Canning River Delta, January-December;
- (7) the Barter Island - Demarcation Point Area, January-December;
- (8) the Colville River Delta, January-December;
- (9) the Cross, Pole, Egg, and Thetis Islands, June-October;
- (10) the Flaxman Island waterfowl use and polar bear denning areas, January-December;
- (11) the Jones Island Group (Pingok, Spy, and Leavitt Islands) and Pole Island are known polar bear denning areas, November-April; and
- (12) the Sagavanirktok River delta, January-December.

These areas are among areas of special biological and cultural sensitivity to be considered in the OSCP required by 30 CFR 250.300. Lessees are advised that they have the primary responsibility for identifying these areas in their OSCP and for providing specific protective measures. Additional areas of special biological and cultural sensitivity may be identified during review of exploration plans and development and production plans.

Industry should consult with FWS or State of Alaska personnel to identify specific environmentally sensitive areas within National Wildlife Refuges or State special areas which should be considered when developing a project-specific OSCP. Consideration should be given in an OSCP as to whether use of dispersants is an appropriate defense in the vicinity of an area of special biological and cultural sensitivity. Lessees are advised that prior approval must be obtained before dispersants are used.

Additional mitigation may be required by FWS through the MMPA and the ESA. The FWS has MMPA Incidental Take Regulations currently in effect for the Beaufort Sea (71 *FR* 43926-43953). These regulations remain in effect from August 2, 2006, through August 2, 2011. The regulations for Beaufort Sea oil and gas activities encompass exploration, development, and production activities. Mitigation measures applied through the Incidental Take Regulations may include FLIR imagery flights to determine the location of active dens, avoiding all denning activity by a minimum of 1 mile, intensified monitoring of an area or avoiding the area during the denning period. In some

instances, work camps or facilities may be relocated to avoid potential interactions with polar bears. Aerial surveys may be required to locate bears in the area. These mitigation measures will vary depending upon the type of industry activity, the location, time of year and other factors.

Under the MMPA and ESA, the FWS is responsible for polar bears, sea otters, walruses, and migratory birds. Procedural regulations implementing the provisions of the MMPA for FWS are found at 50 CFR Part 18.27. Incidental taking of marine mammals and endangered and threatened species is allowed only when the statutory requirements of the MMPA and/or the ESA are met. Section 101(a)(5) of the MMPA (16 U.S.C. 1371(a)(5)) allows for the taking of small numbers of marine mammals incidental to a specified activity within a specified geographical area, as long as such take is determined to have a “negligible” effect on the population. Section 7(b)(4) of the ESA (16 U.S.C. 1536(b)(4)) allows for the incidental taking of endangered and threatened species under certain circumstances, as long as such take is not determined to have a population-level effect. If a marine mammal species is listed as endangered or threatened under the ESA, the requirements of both the MMPA and the ESA must be met before the incidental take can be allowed.

Incidental, but not intentional, taking is authorized only by U.S. citizens holding an LOA issued pursuant to these regulations. An LOA or IHA must be requested annually. Behavioral disturbance of most birds and mammals found in or near the lease area would be unlikely if aircraft and vessels maintain at least a 1-mile horizontal distance and aircraft maintain at least a 1,500-foot vertical distance above known or observed wildlife concentration areas, such as bird colonies and marine mammal haulout and breeding areas. For the protection of endangered whales and marine mammals throughout the lease area, it is recommended that all aircraft operators maintain a minimum 1,500-foot altitude when in transit between support bases and exploration sites. Lessees and their contractors are encouraged to minimize or reroute trips to and from the leasehold by aircraft and vessels when endangered polar bears are likely to be in the area. Human safety will take precedence at all times over these recommendations. The current Beaufort Sea ITRs for polar bear include mitigation, monitoring and reporting requirements for operators. Each request for an LOA is carefully reviewed by the FWS, and LOAs may include conditions to afford additional protections to sensitive areas, such as denning habitats.

Current ITR for the Beaufort Sea remain in effect until August 2, 2011. When the polar bear was listed under the ESA on May 15, 2008, FWS conducted an intra-agency consultation on the MMPA Beaufort Sea ITR and determined that the LOA process under the MMPA was not likely to jeopardize the continued existence of the polar bear. The FWS also has determined that the LOA process provides sufficient protection for the polar bear to serve as adequate consultation under the ESA. Therefore, a company has met its obligations under the ESA as long as they obtain and follow the requirements of an LOA. An LOA will not be issued to a company unless their proposed activity has been determined to have no more than negligible effects on the polar bear. Mitigation

measures required through the LOA process typically include notifying FWS within 24 hours of any sighting of or interaction with a polar bear.

Additional mitigation may be required by FWS through the MMPA and the ESA. The FWS has MMPA ITR currently in effect for the Beaufort Sea (71 *FR* 43926-43953). These regulations remain in effect from August 2, 2006, through August 2, 2011. The regulations for Beaufort Sea oil and gas activities encompass exploration, development, and production activities. Mitigation measures applied through the ITR generally include FLIR imagery flights to determine the location of active dens, avoiding all denning activity by a minimum of 1 mile, intensified monitoring of an area or avoiding the area during the denning period. In some instances, work camps or facilities may be relocated to avoid potential interactions with polar bears. Aerial surveys may be required to locate bears in the area. These mitigation measures will vary depending upon the type of industry activity, the location, time of year and other factors.

## **1.2. Mitigation Measures for Threatened and Endangered Birds**

### **Oil and Gas Activities on the Chukchi Sea and Beaufort Sea OCS**

The following mitigation measures are in effect to protect ESA-listed and other marine and coastal birds during Federal and State seismic activities and exploration drilling operations in the Chukchi Sea and Beaufort Sea. The Federal measures represent the collective result of recent Section 7 consultations for lease sales (Lease Sales 193, 186, 195, and 202) and programmatic seismic activities in the Chukchi and Beaufort seas.

#### **Seismic Activities:**

- No seismic activity, including resupply vessels and other related traffic, will be permitted within the Ledyard Bay spectacled eider critical habitat area following July 1 of each year, unless human health or safety dictates otherwise.
- Seismic-survey support aircraft must avoid overflights across the Ledyard Bay spectacled eider critical habitat area below an altitude of 1,500 ft (450 m) after July 1 of each year, unless human health or safety dictates otherwise. Seismic-survey support aircraft would maintain at least a 1,500 ft (305 m) altitude over beaches, lagoons, and nearshore waters as much as possible. Designating aircraft flight routes will be established for situations when aircraft associated with seismic activity cannot maintain >1,500 ft above sea level (ASL) over the Ledyard Bay Critical Habitat Area.
- Ramping-up procedures will be used when initiating airgun operations.
- Seismic-survey and support vessels will minimize operations that require high-intensity work lights, especially within the 20-m-bathymetric contour. High-intensity lights will be turned off in inclement weather when the seismic vessel is not actively conducting seismic surveys. However, navigation lights, deck lights, and interior lights could remain on for safety.
- All bird-vessel collisions (with vessels or aircraft) shall be documented and reported within 3 days to MMS. Minimum information will include species, date

and time, location, weather, and if a vessel is involved in its operational status when the strike occurred. Bird photographs are not required but would be helpful in verifying species. Operators are advised that FWS does not recommend recovery or transport of dead or injured birds due to avian influenza concerns.

- Operators must maintain a minimum spacing of 15 mi between the seismic-source vessels for separate operations.
- Whenever vessels are in the marine environment, there is a possibility of a fuel or toxic-substance spill. If vessels transit through the spring lead system before June 10, they may encounter concentrations of listed eiders. The FWS therefore requires that wildlife hazing equipment (including Breco buoys or similar equipment) be prestaged and readily accessible by personnel trained in their use, either on the vessel, at Point Lay or Wainwright, or on an on-site oil-spill-response vessel, to ensure rapid deployment in the event of a spill.

Spectacled and Steller's eiders could experience direct mortality through collisions with vessels, aircraft, or drilling structures. Specific measures to be implemented that would minimize the potential for adverse effects to ESA-listed eiders from MMS-authorized activities on existing leases in the Chukchi Sea are (USDOI, MMS, 2007, Final Notice of Sale for Lease Sale 193):

**Stipulation No. 7. Measures to Minimize Effects to Spectacled and Steller's Eiders During Exploration Activities.** This stipulation will minimize the likelihood that spectacled and Steller's eiders will strike drilling structures or vessels. The stipulation also provides additional protection to eiders within the blocks listed below and Federal waters landward of the sale area, including the Ledyard Bay Critical Habitat Area, during times when eiders are present.

**(A) General conditions:** The following conditions apply to all exploration activities.

- (1) An EP must include a plan for recording and reporting bird strikes. All bird collisions (with vessels, aircraft, or drilling structures) shall be documented and reported within 3 days to MMS. Minimum information will include species, date/time, location, weather, identification of the vessel, and aircraft or drilling structure involved and its operational status when the strike occurred. Bird photographs are not required, but would be helpful in verifying species. Lessees are advised that the FWS does not recommend recovery or transport of dead or injured birds due to avian influenza concerns.
- (2) The following conditions apply to operations conducted in support of exploratory and delineation drilling.
  - (a) Surface vessels (e.g., boats, barges) associated with exploration and delineation drilling operations should avoid operating within or traversing the listed blocks or Federal waters between the listed blocks and the coastline between April 15 and June 10, to the maximum extent practicable. If surface vessels must traverse this area during this period, the surface vessel operator will have ready access to wildlife hazing equipment (including at least three *Breco* buoys or similar devices) and personnel trained in its use; hazing equipment may located onboard the vessel or on a nearby oil spill response vessel, or in Point Lay or Wainwright. Lessees are required to provide information regarding their operations within the area upon request of MMS. The MMS may request

information regarding number of vessels and their dates of operation within the area.

(b) Except for emergencies or human/navigation safety, surface vessels associated with exploration and delineation drilling operations will avoid travel within the Ledyard Bay Critical Habitat Area between July 1 and November 15. Vessel travel within the Ledyard Bay Critical Habitat Area for emergencies or human/navigation safety shall be reported within 24 hours to MMS.

(c) Aircraft supporting drilling operations will avoid operating below 1,500 feet above sea level over the listed blocks or Federal waters between the listed blocks and the coastline between April 15 and June 10, or the Ledyard Bay Critical Habitat Area between July 1 and November 15, to the maximum extent practicable. If weather prevents attaining this altitude, aircraft will use pre-designated flight routes. Pre-designated flight routes will be established by the lessee and MMS, in collaboration with the FWS, during review of the EP. Route or altitude deviations for emergencies or human safety shall be reported within 24 hours to MMS.

**(B) Lighting Protocols.** The following lighting requirements apply to activities conducted between April 15 and November 15 of each year.

(1) **Drilling Structures:** Lessees must adhere to lighting requirements for all exploration or delineation drilling structures so as to minimize the likelihood that migrating marine and coastal birds will strike these structures. Lessees are required to implement lighting requirements aimed at minimizing the radiation of light outward from exploration or delineation drilling structures to minimize the likelihood that birds will strike those structures. These requirements establish a coordinated process for a performance-based objective rather than pre-determined prescriptive requirements. The performance-based objective is to minimize the radiation of light outward from exploration/delineation structures while operating on a lease or if staged within nearshore Federal waters pending lease deployment.

Measures to be considered include but need not be limited to the following:

- Shading and/or light fixture placement to direct light inward and downward to living and work structures while minimizing light radiating upward and outward;
- Types of lights;
- Adjustment of the number and intensity of lights as needed during specific activities;
- Dark paint colors for selected surfaces;
- Low-reflecting finishes or coverings for selected surfaces; and
- Facility or equipment configuration.

Lessees are encouraged to consider other technical, operational, and management approaches that could be applied to their specific facilities and operations to reduce outward light radiation. Lessees must provide MMS with a written statement of measures that will be or have been taken to meet the lighting objective, and must



submit this information with an EP when it is submitted for regulatory review and approval pursuant to 30 CFR 250.203.

**(2) Support Vessels:** Surface support vessels will minimize the use of high-intensity work lights, especially when traversing the listed blocks and federal waters between the listed blocks and the coastline. Exterior lights will be used only as necessary to illuminate active, on-deck work areas during periods of darkness or inclement weather (such as rain or fog); otherwise they will be turned off. Interior lights and lights used during navigation could remain on for safety.

For the purpose of this stipulation, the listed blocks are as follows:

**NR02-06, Chukchi Sea:** 6624, 6625, 6674, 6675, 6723-6725, 6773-6775, 6822, 6823, 6872

**NR03-02, Posey:** 6872, 6873, 6918-6923, 6967-6973, 7016-7023, 7063-7073, 7112-7123

**NR03-03, Colbert:** 6674, 6723, 6724, 6771-6774, 6820-6824, 6869-6874, 6918-6924, 6966-6974, 7015-7024, 7064-7074, 7113-7124

**NR03-04, Solivik Island:** 6011-6023, 6060-6073, 6109-6122, 6157-6171, 6206-6219, 6255-6268, 6305-6317, 6354-6365, 6403-6414, 6453-6462, 6502-6511, 6552-6560, 6601-6609, 6651-6658, 6701-6707, 6751-6756, 6801-6805, 6851-6854, 6901-6903, 6951, 6952, 7001

**NR03-05, Point Lay West:** 6014-6024, 6062-6073, 6111-6122, 6160-6171, 6209-6221, 6258-6269, 6307-6317, 6356-6365, 6406-6414, 6455-6462, 6503-6510, 6552-6558, 6602-6606, 6652-6655, 6702, 6703

**NR04-01, Hanna Shoal** 6223, 6267-6273, 6315-6323, 6363-6373, 6411-6423, 6459-6473, 6507-6523, 6556-6573, 6605-6623, 6654-6671, 6703-6721, 6752-6771, 6801-6819, 6851-6868, 6901-6916, 6951-6964, 7001-7010, 7051-7059, 7101-7107

**NR04-02, Barrow:** 6003-6022, 6052-6068, 6102-6118, 6151-6164, 6201-6214, 6251-6262, 6301-6312, 6351-6359, 6401-6409, 6451-6456, 6501-6506, 6551, 6552, 6601, 6602

**NR04-03, Wainwright:** 6002-6006, 6052, 6053

**NS04-08, (Unnamed):** 6816-6822, 6861-6872, 6910-6922, 6958-6972, 7007-7022, 7055-7072, 7104-7122

Nothing in this stipulation is intended to reduce personnel safety or prevent compliance with other regulatory requirements (e.g., U.S. Coast Guard or Occupational Safety and Health Administration) for marking or lighting of equipment and work areas.

**Note:** The MMS and FWS have reconsulted under Section 7 of the ESA on a case-by-case basis for exceptions to these mitigation measures. For the 2006-2008 summers, industry has been required by the NMFS to deploy an array of passive acoustic monitoring devices, three stations were within the outer margin of the LBCHA after July 1, as a condition of their Incidental Harassment Authorization under the MMPA. The MMS or NMFS determined, and the FWS concurred, that a maximum number of three trips into and out of the LBCHA under the shortest possible, pre-determined route was

not likely to adversely affect threatened eiders. Other industry vessel traffic associated with MMS-authorized activities has been directed to use nearshore areas not included in the LBCHA or have used the margin of the LBCHA in consideration of maritime safety - all consistent with the intent of these mitigation measures.

Mitigation Measures for the existing and anticipated Beaufort Sea Lease Sales on State of Alaska lands specific to protection of bird resources (ADNR 2008) include:

22. Birds:

- a. Permanent, staffed facilities must be sited to the extent feasible and prudent outside identified brant, white-fronted goose, snow goose, tundra swan, king eider, common eider, Steller's eider, spectacled eider, and yellow-billed loon nesting and brood rearing areas.
- b. Due to high concentrations of staging and molting brant and other waterbirds within the coastal habitats along the Teshekpuk Lake Special Area (TLSA) and other areas, operations that create high levels of disturbance, including but not limited to dredging, gravel washing, and boat and barge traffic along the coast, will be prohibited from June 20 to September 15 within one-half mile of coastal salt marshes, specifically .... In addition, Tracts 228 and 231 are subject to the same restrictions between May 15 and July 30 to protect large concentrations of breeding snow geese. The construction and siting of facilities within one mile of these areas may be allowed on a case-by-case basis if the Director, DO&G and ADF&G determine that no other feasible and prudent location exists.

Similarly, the NSB has passed local ordinances that we assume apply to existing state leases:

- 1a. Lessees shall comply with the Recommended Protection Measures for Spectacled and Steller's Eiders developed by the FWS to ensure adequate protection of spectacled eiders during the nesting and brood rearing periods.
6. Aircraft Restrictions: To protect species that are sensitive to noise or movement, horizontal and vertical buffers will be required, consistent with aircraft, vehicle and vessel operations regulated by NSB Code §19.70.050(I)(1) which codifies NSBCMP policy 2.4.4.(a). Lessees are encouraged to apply the following provisions governing aircraft operations in and near the proposed sale area:
  - a. From June 1 to August 31, aircraft overflights must avoid identified brant, white-fronted goose, tundra swan, king eider, common eider, and yellow-billed loon nesting and brood rearing habitat, and from August 15 to September 15, the fall staging areas for geese, tundra swans, and shorebirds, by an altitude of 1,500 feet, or a lateral distance of one mile.

## **2. Mitigation Measures for Future Sales under 5-Year Program**

The following mitigation measures are proposed for future sales under the current MMS 5-Year Program in the Beaufort and Chukchi seas. Some of the mitigation measures

were developed over recent years for lease sales and for the continuing program in the Alaska OCS.

## **2.1. Stipulations.**

### **Stipulation No. 1 – Orientation Program.**

The lessee shall include with any Exploration Plan (EP) or Development and Production Plan (DPP) submitted under 30 CFR 250.212 and 250.242, respectively, an overview of a proposed orientation training program for all personnel (including personnel of the lessee’s agents, contractors, and subcontractors) involved in on-site exploration, development, production, and support activities.

The orientation program shall inform on-site personnel about environmental, biological, social, and cultural concerns that relate to oil and gas activities on the OCS and adjacent areas. The program shall address the importance of not disturbing biological resources and habitats and include an explanation of “take” definitions under the ESA and MMPA. The program shall include guidance about restrictions on approaching marine mammals and how to avoid disturbance of marine mammals. The program shall be designed to increase the awareness and understanding of industry personnel to local community values, customs, and lifestyles, including an overview of the Iñupiaq culture and the importance of subsistence hunting and sharing practices. The orientation program shall include information concerning avoidance of conflicts with subsistence activities. The program shall address the importance of not disturbing archaeological, cultural, and historic resources and provide guidance on how to avoid disturbance of these resources.

All personnel involved in on-site exploration or development and production activities (including personnel of the lessee’s agents, contractors, and subcontractors) and all supervisory and managerial personnel overseeing such activities must complete the orientation training program before beginning onsite work and annually thereafter. Evidence of completion of the orientation program by individuals employed by the lessee is subject to MMS onsite inspection.

Upon request from the Regional Supervisor/Field Operations (RS/FO), orientation material shall be made available for MMS review. The RS/FO may require materials to be modified if MMS review determines the materials do not adequately cover the environmental, biological, social, and cultural concerns of the area.

**Summary of the Effectiveness.** This stipulation requires that all personnel involved in oil and gas activities on the OCS and adjacent areas in support of this OCS leases be made aware of the unique environmental, social, and cultural values of the local Iñupiat residents and their environment. This stipulation should help avoid disturbance, damage, or destruction of environmental, cultural, and archaeological resources through awareness

and understanding of historical and cultural values and environmental protection laws. This stipulation would help minimize potential conflicts between subsistence hunting and gathering activities and oil and gas activities. The extent of mitigation offered by this stipulation is difficult to measure directly or indirectly. This orientation program educates personnel on minimizing potential disturbances to polar bears.

**Stipulation No. 2 – Measures Required to Minimize Effects on Species Listed under the Endangered Species Act.**

Operations conducted in support of exploration and development activities on this OCS lease are required to adhere to the conditions of the most recent Biological Opinions issued by the Fish and Wildlife Service and the National Marine Fisheries Service.

**Summary of the Effectiveness.** The Biological Opinions issued by the FWS and the NMFS often specify measures necessary and appropriate to minimize potential adverse impacts to protected species. This stipulation is expected to reduce potential effects of OCS exploration and development on protected species. For example, this stipulation is expected to reduce the potential for spectacled and Steller's eiders to strike structures, which would lessen the potential effect of OCS exploration and development on these species.

Stipulation 2 states that operations authorized or permitted by MMS will be required to adhere to conditions set forth in the most recent Biological Opinion issued by the FWS on polar bears. The BO is expected to outline specific conservation measures required to decrease the potential for impacts on the polar bear population. These may be in the form of RPMs (Reasonable and Prudent Measures) or Terms and Conditions (T & Cs). Many of these mitigation measures may already be in place through the MMPA/LOA process. Additional protective measures for habitats determined by the FWS to be critical habitat under the ESA may be enforced. FWS anticipates that the process of identifying and designating critical habitat for the polar bear may be completed in 2010.

**Stipulation No. 3 (Beaufort Sea OCS leases only) – Permanent Facility Siting in the Vicinity Seaward of Cross Island.**

Permanent sea-surface production facilities within a 10-mi radius seaward of Cross Island are prohibited unless the lessee demonstrates to the satisfaction of the Regional Director that the development will not preclude reasonable subsistence access to whales. This stipulation applies to any OCS lease on the blocks listed below.

OPD; NR 06-03 Beechey Point; Blocks: 6415A; 6416A; 6417A; 6418A; 6419A; 6464B, D, F; 6465A, B; 6466A, B; 6467A, B; 6468A, B; 6469A, B; 6470A; 6514B, D, E, F, H; 6515B, C, D, E; 6516B, C, F; 6517B, D; 6518B; 6519A, B; 6520A; 6521A; 6565B; 6566B, E; 6568B; 6569A, B; 6570A, B; 6571A, C; 6618B, C, E; 6619A, B, C; 6620B, D; 6621B; 6670B.

**Summary of the Effectiveness.** This stipulation prohibits permanent sea-surface facilities within a 10-mi radius seaward of Cross Island, unless the lessee demonstrates to the satisfaction of the MMS Regional Director that such a facility would not preclude reasonable subsistence access. This stipulation is expected to reduce the potential conflict between subsistence-hunting activities and oil and gas development and operational activities within the key subsistence areas seaward of Cross Island, where the community of Nuiqsut's subsistence whaling takes place. This stipulation also could reduce the potential that noise from a facility in this area could deflect the bowhead whales farther offshore.

Stipulation 3 requires that no permanent facilities be located within 10 miles seaward of Cross Island. Cross Island is a very important site for polar bears aggregating on shore while waiting for freeze up and access to the offshore ice environment. This stipulation would protect a portion of that area and decrease the possibility that MMS authorized activities in the vicinity would impact polar bear movements.

This stipulation could prevent the development and production of oil and gas resources (if they exist and are discovered during exploration), if it is determined by the Regional Director that the proposed facilities would preclude reasonable access to subsistence bowhead whales.

**2.3. Notices to Lessees.** The objectives of several of the lease stipulations evaluated in the previous Arctic OCS lease sale EISs are more appropriately addressed via NTLs (see Section 2.2.1 for discussion). The provisions of these stipulations are required through existing MMS operating regulations. The proposed new NTLs inform lease owners/operators that they must meet the provisions of the regulations and how they are to operate under the applicable regulations. The proposed new NTLs are summarized below. The full text of the proposed NTLs is provided in Appendix F.

**NTL No. 08-A01 Protection of Biological Resources.** This NTL provides guidance to the lease owner/operator related to protection of previously unidentified biological populations or habitats that may be discovered during the conduct of any operations on a lease. It is issued to clarify and interpret the requirements contained in regulations for protection of seafloor resources. The lease owner/operator shall make reasonable efforts to protect the newly discovered biological resource from effects from operations until the RS/FO instructs the lease owner/operator on what measures, if any, are required to avoid or minimize adverse effects to the biological resource pursuant to 30 CFR 250.201 and 30 CFR 250.202.

**NTL No. 08-A02 Protection Subsistence Whaling and Other Marine Mammal Subsistence-Harvest Activities.** This NTL provides guidance to the lease owner/operator related to protection of subsistence-harvest of whales and other marine mammals during the conduct of any operations on a lease. It is issued to clarify and interpret the requirements contained in regulations for protection of subsistence activities. The MMS operating regulations at 30 CFR 250.202 state that proposed activities shall be conducted in a manner that does not unreasonably interfere with other uses of the OCS

and does not cause undue or serious harm to the human environment. Operating regulations at 30 CFR 250.209 state that ancillary activities also must comply with the performance standards of 30 CFR 250.202. Operating regulations at 30 CFR 250.221(b), 30 CFR 250.223, 30 CFR 250.252(b), and 30 CFR 250.254 require OCS lease owners/operators to provide information on how they will conduct their proposed activities in a manner consistent with the provisions of the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). Exploration, development, production, and support activities, including ancillary activities, shall be conducted in a manner that prevents reasonably foreseeable conflicts between the lease owner/operator activities and subsistence activities (including, but not limited to, bowhead whale and other marine mammal subsistence hunting). If proposed activities have the potential to adversely affect subsistence-harvest activities, MMS will require EPs or DPPs to include an Adaptive Management and Mitigation Plan.

**NTL No. 08-A03 Industry Site-Specific Marine Mammal Monitoring Programs.**

This NTL provides guidance to the lease owner/operator related to monitoring of marine mammals during the conduct of any operations on a lease. The MMS final rule published in the *Federal Register* on April 13, 2007 (Vol. 72, No. 71, pp. 18577-18585) requires OCS lease owners/operators to provide information on how they will conduct their proposed activities in a manner consistent with the provisions of the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). The final rule identifies environmental, monitoring, and mitigation information that must be submitted with Exploration Plans (EPs) and Development and Production Plans (DPPs). The final rule requires lease owners/operators to describe how they will mitigate the potential for takes to occur, monitor for potential takes, and report takes should they occur. The MMS operating regulations at 30 CFR 250.221(b) and 30 CFR 250.223 are requirements for EPs to include descriptions of monitoring and mitigation measures to address federally listed species and marine mammals if there is reason to believe the exploration activities may result in an incidental take. The MMS operating regulations at 30 CFR 250.252(b) and 30 CFR 250.254 are requirements for DPPs to include descriptions of monitoring and mitigation measures to address federally listed species and marine mammals if there is reason to believe the development and production activities may result in an incidental take. The NTL clarifies and interprets the requirements contained in regulations.

**NTL No. 08-A04 Marine Mammal Protection Act Authorizations.** This NTL provides guidance to the lease owner/operator related to the need for obtaining authorization from the NMFS and/ or the FWS pursuant to the MMPA. It is issued to clarify and interpret the requirements contained in regulations for conduct of activities in a manner consistent with the provisions of the MMPA. The MMS will not authorize activities that it believes may result in an unauthorized and, therefore, illegal incidental take.

Effectiveness of this NTL to protect Polar Bears: Notice to Lessees No. 08-A04 clarifies that MMS will not authorize or permit activities that may result in the take (as defined by the MMPA) of any marine mammal, unless the FWS has determined that any potential

take that occurs incidentally to the proposed activity would result in a negligible impact to the species and the Lessee is in possession of an LOA or IHA. This insures that Lessees are advised to consult with the FWS prior to beginning any industry activities in areas that may be used by polar bears. Current Incidental Take Regulations for the Beaufort Sea require that applicants for LOAs have a plan to monitor the effects of their activities on polar bears, report any sightings of or interactions with polar bears to the FWS within 24 hours, and have a plan of cooperation in place to minimize potential impacts to subsistence hunting. Depending upon the proposed work area, applicants may also be required to conduct den surveys to identify any potential dens prior to the onset of work and to avoid any known dens by a minimum of one mile, to have plans in place to minimize bear attractants (food smells, garbage, etc.) and other mitigation measures as FWS deems necessary.

**2.4. Information to Lessees.** The objectives of several of the lease stipulations evaluated in the previous Arctic OCS lease sale EISs are more appropriately addressed via ITLs (see Section 2.2.1 for discussion). The proposed new ITLs are summarized below. The full text of the proposed ITLs is provided in Appendix F of the Arctic Multiple-Sale DEIS.

**At-Sea Fuel Transfers.** This ITL advises lessees that all at-sea fuel-transfers conducted in support of activities related to exploration and development of leases issued as a result of a proposed sale will be subject to the provisions of the following:

- Oil Pollution Act of 1990;
- Executive Order 12777: Implementation of Section 311 of the Federal Water Pollution Control Act of October 18, 1972, as Amended, and the Oil Pollution Act of 1990 (<http://www.mms.gov/offshore/OilSpillProgram/Assets/PDFs/EO12777-OSP.pdf>);
- Memorandum of Agreement Between the Minerals Management Service-U.S. Department of the Interior and the U.S. Coast Guard-U.S. Department of Homeland Security (MMS/USCG MOA: OCS-04 Floating Offshore Facilities) (<http://www.mms.gov/MOU/PDFs/MOA-USCG04FloatingFacilities-Final.pdf>); and
- U.S. Coast Guard implementing regulations at 33 CFR 156 Subpart C - Special Requirements for Lightering of Oil and Hazardous Material Cargoes (<http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi>).

**Transportation of Hydrocarbons.** This ITL advises lessees that MMS considers pipelines to be the technologically and environmentally preferred method for transportation of OCS-produced oil to shore.

**Information on the Spectacled Eider and Steller's Eider.** This ITL advises lessees that the spectacled eider (*Somateria fischeri*) and Steller's eider (*Polysticta stelleri*) are listed as threatened by the FWS and are protected by the ESA (16 U.S.C. 1531 et seq.). Lessees are advised that exploration and development and production plans submitted to MMS will be reviewed by the FWS to ensure that spectacled eider, Steller's eider, and

their habitats are protected and that MMS will reconsult with FWS on the potential effects of proposed development and production activities. Lease Stipulation 2 requires lessees to adhere to the conditions of the most recent Biological Opinion issued by the FWS pertaining to post-lease activities. The ITL notifies lessees of the specific requirements under the current Biological Opinion.

**ITL Information on the Spectacled Eider and Steller's Eider.** Lessees are advised that the spectacled eider (*Somateria fischeri*) and Steller's eider (*Polysticta stelleri*) are listed as threatened by the Fish and Wildlife Service (FWS) and are protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.).

Spectacled eiders and Steller's eiders are present in the Chukchi Sea during spring migration in May and June. Males return to the open sea in late June, while nesting females remain on the arctic coastal tundra until late August or early September, when they move to coastal areas of the Beaufort and Chukchi seas for brood-rearing. Molting eiders occur in certain offshore areas until freeze-up (typically in November). Onshore activities related to OCS exploration, development, and production during the summer months (May-September) may affect nesting spectacled eiders and Steller's eiders.

Lessees are advised that exploration and development and production plans submitted to MMS will be reviewed by the FWS to ensure that spectacled eider, Steller's eider, and their habitats are protected. For the proposed lease sales, MMS is specifically requesting an incremental Section 7 consultation with the FWS. The MMS will consult with FWS on potential effects of leasing and seismic/exploration activities.

As few details are known regarding the specific location/design of a future development, therefore that stage of activity will require further consultation with the FWS. To allow this stepwise approach, FWS must find that the leasing and seismic/exploration stage of the lease sales would not result in a jeopardy determination to either the Steller's eider or spectacled eider nor would adverse modification of spectacled eider critical habitat occur.

The FWS must also evaluate our evaluation of potential development and production that could occur as a result of leasing and exploration locating a commercially viable discovery and conclude that there is a reasonable likelihood that the entire action will not violate Section 7(a)(2) of the Endangered Species Act. Section 7(a)(2) of the Act requires that Federal agencies ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species or adversely modify designated critical habitat. Lessees are advised that future development projects arising from lease sales in the Chukchi (212 and 221) and Beaufort (209 and 217) seas will be subject to future Section 7 consultation with the FWS and a future project would not be authorized by MMS if it is likely to result in jeopardy or adverse modification of designated critical habitat as determined by FWS.



Stipulation 2 states that leases are required to adhere to the conditions of the most recent Biological Opinion issued by the FWS pertaining to post-lease activities. The following conditions apply to the Beaufort Sea.

**Beaufort Sea: Measures to Minimize Effects to Spectacled and Steller's Eiders during Exploration Activities in the Beaufort Sea.**

The following measures minimize the likelihood that Steller's and spectacled eiders would strike drilling structures or vessels. They also provide additional protection to eiders within other important areas, including the Ledyard Bay Critical Habitat Area, during times when eiders are present. The mitigation measures would protect ESA-listed and other marine and coastal birds during seismic activities and exploration drilling operations in the Beaufort Sea. These measures are consistent with recent Section 7 consultations for Lease Sales 186, 195, and 202 and programmatic seismic activities in the Beaufort Sea. Case-by-case exceptions require reconsultation under the ESA with the FWS.

**A) General Conditions.** The following conditions apply to all lease exploration and support activities.

- (1) Vessels will minimize the use of high-intensity work lights, especially within the 20-m-bathymetric contour. Exterior lights will be used only as necessary to illuminate active, on-deck work areas during periods of darkness or inclement weather (such as rain or fog), otherwise they will be turned off. Interior lights and lights used during navigation could remain on for safety.
- (2) An Exploration Plan, ancillary activities, and other proposed lease activities must include a plan for recording and reporting bird strikes. All bird collisions (with vessels, aircraft, or drilling structures) shall be documented and reported within 3 days to MMS. Minimum information will include species, date/time, location, weather, identification of the vessel, aircraft or drilling structure involved and its operational status when the strike occurred. Bird photographs are not required, but would be helpful in verifying species. Lessees are advised that the U.S. Fish and Wildlife Service (FWS) does not recommend recovery or transport of dead or injured birds due to avian influenza concerns.

**B) Seismic Activities.** The following conditions apply to any seismic survey activities and supporting vessels and aircraft supporting those activities.

- (1) No vessels associated with Beaufort Sea seismic survey activity en route to the Beaufort Sea will be permitted within the Ledyard Bay Critical Habitat Area following July 1 of each year, unless human health or safety dictates otherwise.
- (2) Seismic-survey support aircraft would maintain at least a 1,500 ft (305 m) altitude over beaches, lagoons, and nearshore waters of the Beaufort Sea as much as possible. Support aircraft associated with Beaufort Sea seismic survey activities are not expected to operate over the Ledyard Bay Critical Habitat Area. If so, however, aircraft must avoid overflights across the Ledyard Bay Critical Habitat Area below an altitude of 1,500 feet (450 meters) after July 1 of each year, unless human health or safety dictates otherwise.

- (3) Whenever vessels are in the marine environment, there is a possibility of a fuel or toxic substance spill. If seismic-related vessels transit through the spring lead system before June 10 they may encounter concentrations of listed eiders. These vessels are required to have wildlife hazing equipment (including Breco buoys or similar equipment) pre-staged, and readily accessible by personnel trained in their use, either on the vessel, at Point Lay or Wainwright, or on an on-site Oil Spill Response Vessel, in order to ensure rapid deployment in the event of a spill.
- (4) The spring lead system is defined as the Ledyard Bay Critical Habitat Area as well as the Federal OCS areas landward from an imaginary line extending from the outer corner of the Critical Habitat Area (70°20'00" N. x 164°00'00" W.) extending northeast to the southeastern-most corner of the Lease Sale 193 Sale Area (71°39'35" N. x 156°00'00" W.) and the area landward of an imaginary line drawn between Point Hope and the other outer corner of the Ledyard Bay Critical Habitat Area (69°12'00" N. x 166°13'00" W.).

**C) Drilling Activities.** The following conditions apply to operations conducted in support of exploratory and delineation drilling.

- (1) Surface vessels (e.g., boats, barges) associated with exploration and delineation drilling operations should avoid operating within or traversing the Chukchi Sea spring lead system between April 15 and June 10 to the maximum extent practicable. If surface vessels must traverse this area during this period, the surface vessel operator will have ready access to wildlife hazing equipment (including at least 3 *Breco* buoys or similar devices) and personnel trained in its use; hazing equipment may be located on-board the vessel or on a nearby Oil Spill Response Vessel, or in Point Lay or Wainwright. Lessees are required to provide information regarding their operations within the area upon request of MMS. The MMS may request information regarding number of vessels and their dates of operation within the area.
- (2) Except for emergencies or human/navigation safety, surface vessels associated with Beaufort Sea exploration and delineation drilling operations will avoid travel within the Ledyard Bay Critical Habitat Area between July 1 and November 15. Vessel travel within the Ledyard Bay Critical Habitat Area for emergencies or human/navigation safety shall be reported within 24 hours to MMS.

**D) Lighting Protocols.** The following requirements apply to all new and existing Outer Continental Shelf oil and gas leases issued west of 146° W. longitude for activities conducted between April 15 and November 15. The MMS encourages operators to consider such measures in areas to the east of 146° W. longitude because occasional sightings of listed eiders have been made there and because such measures could reduce the potential for collisions of other, non-ESA listed migratory birds that are protected under the Migratory Bird Treaty Act.

Lessees are required to implement lighting requirements aimed at minimizing the radiation of light outward from exploration or delineation drilling structures to minimize the likelihood that birds would strike those structures. These requirements establish a

coordinated process for a performance-based objective rather than pre-determined prescriptive requirements. The performance-based objective is to minimize the radiation of light outward from exploration/delineation structures while operating on a lease or if staged within nearshore federal waters pending lease deployment.

Measures to be considered include but need not be limited to the following:

- (1) Shading and/or light fixture placement to direct light inward and downward to living and work structures while minimizing light radiating upward and outward;
- (2) Types of lights;
- (3) Adjustment of the number and intensity of lights as needed during specific activities;
- (4) Dark paint colors for selected surfaces;
- (5) Low-reflecting finishes or coverings for selected surfaces; and
- (6) Facility or equipment configuration.

Lessees are encouraged to consider other technical, operational and management approaches that could be applied to their specific facility and operation to reduce outward light radiation. Lessees must provide MMS with a written statement of measures that will be or have been taken to meet the lighting objective and submit this information with an Exploration Plan when it is submitted for regulatory review and approval pursuant to 30 CFR 250.223.

The following conditions apply to the Chukchi Sea.

**Chukchi Sea: Measures to minimize effects to spectacled and Steller's eiders during exploration activities in the Chukchi Sea.** The following measures minimize the likelihood that Steller's and spectacled eiders would strike drilling structures or vessels. They also provide additional protection to eiders within other important areas, including the Ledyard Bay Critical Habitat Area, during times when eiders are present. The mitigation measures would protect birds listed under the Endangered Species Act ("ESA-listed") and other marine and coastal birds during seismic activities and exploration drilling operations in the Chukchi Sea. These measures are consistent with the recent Section 7 consultations for Lease Sale 193 and programmatic seismic activities in the Chukchi Sea. Case-by-case exceptions require re-consultation under the ESA with the FWS.

**A) General condition.** The following conditions apply to all lease exploration and support activities.

- (1) Vessels will minimize the use of high-intensity work lights, especially when traversing the spring lead system. Exterior lights will be used only as necessary to illuminate active, on-deck work areas during periods of darkness or inclement weather (such as rain or fog), otherwise they will be turned off. Interior lights and lights used during navigation could remain on for safety.

- (2) An Exploration Plan, ancillary activities, and other proposed lease activities must include a plan for recording and reporting bird strikes. All bird collisions (with vessels, aircraft, or drilling structures) shall be documented and reported within 3 days to MMS. Minimum information will include species, date/time, location, weather, identification of the vessel, aircraft or drilling structure involved and its operational status when the strike occurred. Bird photographs are not required, but would be helpful in verifying species. Lessees are advised that the U.S. Fish and Wildlife Service (FWS) does not recommend recovery or transport of dead or injured birds due to avian influenza concerns.

**B) Seismic Activities.** The following conditions apply to any seismic survey and the supporting vessels and aircraft supporting those activities.

- (1) No vessels associated with seismic survey activity, including re-supply and other related vessels, will be permitted within the Ledyard Bay Critical Habitat Area following July 1 of each year, unless human health or safety dictates otherwise.
- (2) Seismic survey support aircraft must avoid overflights across the Ledyard Bay Critical Habitat Area below an altitude of 1,500 ft (450 m) above sea level (ASL) after July 1 of each year, unless human health or safety dictates otherwise. Seismic-survey support aircraft shall maintain at least a 1,500 ft (450 m) altitude over beaches, lagoons, and nearshore waters as much as possible. Designated aircraft flight routes will be established for situations when aircraft associated with seismic activity cannot maintain at least 1,500 ft ASL over the Ledyard Bay Critical Habitat Area.
- (3) Whenever vessels are in the marine environment, there is a possibility of a fuel or toxic substance spill. If vessels transit through the spring lead system before June 10 they may encounter concentrations of ESA-listed eiders. These vessels are required to have wildlife hazing equipment (including Breco buoys or similar equipment) pre-staged, and readily accessible by personnel trained in their use, either on the vessel, at Point Lay or Wainwright, or on an on-site Oil Spill Response Vessel, in order to ensure rapid deployment in the event of a spill.
- (4) The spring lead system is defined as the Ledyard Bay Critical Habitat Area as well as the Federal OCS areas landward from an imaginary line extending from the outer corner of the Critical Habitat Area (70°20'00" N. x 164°00'00" W.) extending northeast to the southeastern-most corner of the Lease Sale 193 Area (71°39'35" N. x 156°00'00" W.) and the area landward of an imaginary line drawn between Point Hope and the other outer corner of the Ledyard Bay Critical Habitat Area (69°12'00" N. x 166°13'00" W.).

**C) Drilling Activities:** The following conditions apply to operations conducted in support of exploratory and delineation drilling.

- (1) Surface vessels (e.g., boats, barges) associated with exploration and delineation drilling operations should avoid operating within the Spring Lead System between April 15 and June 10 to the maximum extent practicable. If surface vessels must

traverse this area during this period, the surface vessel operator will have ready access to wildlife hazing equipment (including at least 3 *Breco* buoys or similar devices) and personnel trained in its use; hazing equipment may be located on-board the vessel or on a nearby Oil Spill Response Vessel, or in Point Lay or Wainwright. Lessees are required to provide information regarding their operations within the area upon request of MMS. The MMS may request information regarding number of vessels and their dates of operation within the area.

- (2) Except for emergencies or human/navigation safety, surface vessels associated with exploration and delineation drilling operations will avoid travel within the Ledyard Bay Critical Habitat Area between July 1 and November 15. Vessel travel within the Ledyard Bay Critical Habitat Area for emergencies or human/navigation safety shall be reported within 24 hours to MMS.
- (3) Aircraft supporting drilling operations will avoid operating below 1,500 ft ASL over the spring lead system between April 15 and June 10 and the Ledyard Bay Critical Habitat Area between July 1 and November 15 to the maximum extent practicable. If weather prevents attaining this altitude, aircraft will use pre-designated flight routes. Pre-designated flight routes will be established by the lessee and MMS, in collaboration with the FWS, during review of the Exploration Plan. Route or altitude deviations for emergencies or human safety shall be reported within 24 hours to MMS.

**D) Lighting Protocols.** The following requirements apply to all activities conducted between April 15 and November 15 in the Chukchi Sea.

Drilling Structures: Lessees are required to implement lighting requirements aimed at minimizing the radiation of light outward from exploration or delineation drilling structures to minimize the likelihood that birds would strike those structures. These requirements establish a coordinated process for a performance-based objective rather than pre-determined prescriptive requirements. The performance-based objective is to minimize the radiation of light outward from exploration/delineation structures while operating on a lease or if staged within nearshore federal waters pending lease deployment.

Measures to be considered include but need not be limited to the following:

- (1) Shading and/or light fixture placement to direct light inward and downward to living and work structures while minimizing light radiating upward and outward;
- (2) Types of lights;
- (3) Adjustment of the number and intensity of lights as needed during specific activities;
- (4) Dark paint colors for selected surfaces;
- (5) Low-reflecting finishes or coverings for selected surfaces; and
- (6) Facility or equipment configuration.

Lessees are encouraged to consider other technical, operational and management approaches that could be applied to their specific facility and operation to reduce outward light radiation. Lessees must provide MMS with a written statement of measures that will be or have been taken to meet the lighting objective and submit this information with an Exploration Plan when it is submitted for regulatory review and approval pursuant to 30 CFR 250.203.

**E) Exploratory Drilling Operations in the Ledyard Bay Critical Habitat Area.** The following condition applies to any exploratory and delineation drilling operations proposed to occur in the Ledyard Bay Critical Habitat Area (July 1–November 15).

The drill rig and support vessels must enter the Ledyard Bay Critical Habitat Area from the northwest and proceed directly to the drill site. Support vessels will remain in close proximity to the drill rig while providing support and exit the drill rig vicinity to the northwest until out of the Critical Habitat Area. Deviations from this routing shall be reported within 24 hours to MMS.

Nothing in this ITL is intended to reduce personnel safety or prevent compliance with other regulatory requirements (e.g., U.S. Coast Guard or Occupational Safety and Health Administration) for marking or lighting of equipment and work areas.