

Chukchi Sea Planning Area

Oil and Gas Lease Sale 193
in the Chukchi Sea, Alaska

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Prepared By:
Office of Leasing and Environment
Alaska OCS Region



Alaska Outer Continental Shelf

OCS EIS/EA
MMS 2010-034

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Draft Supplemental Environmental Impact Statement

Prepared by
**Bureau of Ocean Energy Management, Regulation and Enforcement
Alaska OCS Region**

Cooperating Agency
**U.S. Department of Commerce,
National Oceanographic and Atmospheric Administration,
National Marine Fisheries Service**

**U.S. Department of the Interior
Bureau of Ocean Energy Management,
Regulation, and Enforcement
Alaska OCS Region**

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Acronyms and Abbreviations

AAC	Alaska Administrative Code
ACIA	Arctic Climate Impact Assessment
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AEWC	Alaska Eskimo Whaling Commission
AI/AN	American Indian and Alaskan Native populations
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Land Conservation Act
ANS	aquatic nuisance species
ANWR	Arctic National Wildlife Refuge
API	American Petroleum Institute
APD	Application for Permit to Drill
ARBO	Arctic Region Biological Opinion
ASRC	Arctic Slope Regional Corporation
ASWG	Alaska Shorebird Working Group
BCB	Bering-Chukchi-Beaufort Seas stock of bowhead whales
BE	Biological Evaluation
BLM	Bureau of Land Management
BO	Biological Opinion
BOEM	Bureau of Ocean Energy Management, Regulation, and Enforcement
BOP	blowout preventer (system)
B.P.	Before Present
BP	British Petroleum
BPXA	British Petroleum Exploration (Alaska)
CAA	Clean Air Act or Conflict Avoidance Agreement
CAH	Central Arctic (caribou) Herd
CBD	Center for Biological Diversity
CBS	Chukchi/Bering Seas stock of polar bears
CEQ	Council on Environmental Quality
CER	Categorical Exclusion Review
CFCs	chlorofluorocarbons
CFR	Code of Federal Regulations
CI	confidence interval
CIAP	Coastal Impact Assistance Program
CIP	Capital Improvement Program
CO	carbon monoxide
CWA	Clean Water Act
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program (or Plan)
DEW	Distant Early Warning (system)
DO	dissolved oxygen
DPP	Development and Production Plan
Draft EIS	Draft Environmental Impact Statement
Draft SEIS	Draft Supplemental Environmental Impact Statement
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice

EO.....	Executive Order
EP	Exploration Plan
ERA	Environmental Resource Area
ESA	Endangered Species Act
EWC	Eskimo Walrus Commission
FEIS.....	Final Environmental Impact Statement
Final SEIS.....	Final Environmental Impact Statement
FMC.....	Fishery Management Council
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
FOSC.....	Federal On-Scene Coordinator
FR	Federal Register
FSB	Federal Subsistence Board
FWPCA	Federal Water Pollution Control Act
FWS.....	Fish and Wildlife Service
G&G	geological and geophysical
Hz	Hertz
IAP.....	Integrated Activity Plan
ICAS.....	Inupiat Community of the Arctic Slope
IHA	Incidental Harassment Authorization
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
ISB.....	in-situ burn
ISC.....	Ice Seal Commission
ISER	Institute for Social and Economic Research
IWC	International Whaling Commission
ITA	Incidental Take Authorization
ITL.....	Information to Lessees (Clauses)
IUCN/SSG.....	World Conservation Union/Species Survival Commission
LA.....	Launch Area
LNG.....	liquefied natural gas
LOA.....	Letter of Authorization
LS	Land Segment
MBTA	Migratory Bird Treaty Act
MFCMA	Magnuson Fishery Conservation Management Act
MMC	Marine Mammal Commission
MMPA.....	Marine Mammal Protection Act
MMS.....	Minerals Management Service
MOU.....	Memorandum of Understanding
MSA	Magnuson-Stevens Act
NAAQS	National Ambient Air Quality Standards
NC	Nanuk Commission
NEPA.....	National Environmental Policy Act
NFPMC	North Pacific Fisheries Management Council
NHPA	National Historic Preservation Act
NISA.....	National Invasive Species Act of 1996
NMFS	National Marine Fisheries Service
NO _x	nitrogen oxides
NOAA	National Oceanographic and Atmospheric Administration
NOI.....	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPR-A	National Petroleum Reserve in Alaska
NPS.....	National Park Service
NRC.....	National Research Council
NSB	North Slope Borough
NSBMC	North Slope Borough Municipal Code

NSBSAC	North Slope Borough Science Advisory Committee
NTAC's	Nondiscretionary Terms and Conditions
NTL	Notice to Lessees
O ³	ozone
OCRM	Ocean and Coastal Resource Management
OCS	Outer Continental Shelf
OCS Lands Act.....	Outer Continental Shelf Lands Act
OPA/OPA-90.....	Oil Pollution Act of 1990
OSFR	Oil Spill Financial Responsibility
OSRA	Oil Spill Risk Analysis
OSRP	Oil Spill Response Plan
PAC's	polyaromatic compounds
PAH's	polycyclic aromatic hydrocarbons
PEA	Programmatic Environmental Assessment
PM	particulate matter
PM ₁₀	particulate matter less than 10 microns in diameter
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RD	Regional Director
ROD	Record of Decision
ROI	record of increase
ROW	right-of-way
RP	Responsible Party or Recommended Practice
RPM's	Reasonably Prudent Measures
RS/FO	Regional Supervisor/Field Operations
RSV	Royalty Suspension Volume
Sale 193	Chukchi Sea Lease Sale 193
SBS	southern Beaufort Sea stock of polar bears
SDH	social determinants of health
Secretary	Secretary of the Interior
SEIS	Supplemental Environmental Impact Statement
SIP	State Implementation Plan
SLA	Submerged Lands Act
SLS	Spring Lead System
SO ₂	sulfur dioxide
SO ₄	sulfate
TAPS	Trans-Alaska Pipeline System
Tcf	trillion cubic feet
Tcfg	trillion cubic feet of gas
TLH	Teshkepuk Lake (caribou) Herd
UAF	University of Alaska, Fairbanks
U.S.C.	United States Code
USDOC	U.S. Department of Commerce
USDOI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFDA	U.S. Food and Drug Administration
USGS	U.S. Geological Survey
UV	ultraviolet
VOC	volatile organic compounds
WAH	Western Arctic (caribou) Herd

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Chapter I. The Proposed Action

On June 30, 2002, the Secretary approved a Final Outer Continental Shelf Oil and Gas Leasing Program for 2002–2007 (2002–2007 5-Year Program). In compliance with the National Environmental Policy Act (NEPA), Bureau of Ocean Energy Management, Regulation and Enforcement (BOEM) in September 2005 published a Notice of Intent to Prepare an Environmental Impact Statement analyzing a proposed lease sale known as Chukchi Sale 193. The official Draft of this comprehensive document was released in October 2006, and entitled “Draft Environmental Impact Statement for Oil and Gas Lease Sale 193 and Seismic-Surveying Activities in the Chukchi Sea” (USDOl, MMS, 2006). In June 2007, the final document was released and entitled “Final Environmental Impact Statement for Oil and Gas Lease Sale 193 and Seismic-Surveying Activities in the Chukchi Sea” (193 FEIS) (USDOl, MMS, 2007). Sale 193 was held in February 2008 under the 2007–2012 5-Year Program.

On January 31, 2008, a lawsuit was filed alleging violations pursuant to NEPA and the Endangered Species Act [*Native Village of Point Hope v. Salazar*, No. 1:08-cv-00004-RRB (D. Alaska)]. Plaintiffs in the case included Native Village of Point Hope, the City of Point Hope, the Inupiat Community of the Arctic Slope, REDOIL, the Alaska Wilderness League, Center for Biological Diversity, National Audubon Society, Natural Resources Defense Council, Northern Alaska Environmental Center, Oceana, Pacific Environment, Sierra Club, and The Wilderness Society. Two years later, on July 21, 2010, the United States (U.S.) District Court for the District of Alaska issued an Order remanding the Sale 193 matter to BOEM to satisfy its obligations under NEPA in accordance with the Court’s opinion. This District Court Order was amended on August 5, 2010, and guidelines for compliance with the Order were established by the Court on September 2, 2010.

Pursuant to the amended Order, BOEM was instructed to address three concerns, as follows:

- Analyze the environmental impact of natural gas development.
- Determine whether missing information identified by BOEM in the 193 FEIS was essential or relevant under 40 CFR 1502.22.
- Determine whether the cost of obtaining the missing information was exorbitant, or the means of doing so unknown.

This Draft Supplemental Environmental Impact Statement (Draft SEIS) augments the analysis of the 193 FEIS to address the court’s remand. The 193 FEIS is hereby incorporated by reference (available at <http://www.boemre.gov>). Because the agency must after completion of this supplement reconsider its 2007 decision in light of the additional analysis, and because this new analysis must fit within the framework of the original document, this supplemental EIS retains the same purpose and need as the 193 FEIS: (1) to offer for lease areas in the Chukchi Sea Planning Area of the Alaska Outer Continental Shelf (OCS) that might contain economically recoverable oil and gas resources and (2) to provide analyses for exploration seismic-survey activities. This Draft SEIS relies on the existing analysis provided by the 193 FEIS where appropriate, and adds new analysis with respect to the concerns listed above, including the potential development of natural gas. After a formal public and agency comment period, BOEM will make necessary revisions to this Draft SEIS and develop a Final Supplemental Environmental Impact Statement (FSEIS) that satisfies the concerns addressed in the Court’s remand order. The completed FSEIS will provide the Secretary with sufficient information to reaffirm or change the Department’s previous decision on Sale 193. In accordance with Council on Environmental Quality (CEQ) regulations and guidelines, BOEM also intends that further analysis of specific proposed activities may tier from the FSEIS, and that the facts and analysis presented within the FSEIS may be incorporated by reference in future, proposal-specific environmental reviews.

I.A. Purpose and Need for the Proposed Action

The purpose of the proposed actions addressed in the 193 FEIS is to (1) offer for lease areas in the Chukchi Sea Planning Area of the Alaska Outer Continental Shelf (OCS) that might contain economically recoverable oil and gas resources and (2) provide analyses for exploration seismic-survey activities. This Draft SEIS augments the analysis in the 193 FEIS by analyzing the environmental impact of natural gas development and (in Appendix A) evaluating incomplete, missing, or unavailable information pursuant to 40 CFR 1502.22.

A Chukchi Sea Planning Area lease sale and analysis of exploration seismic survey activities forward the purposes of the OCS Lands Act (43 U.S.C. 1331–1356) and its amendments. The OCS Lands Act requires the U.S. Department of the Interior (USDOI) to manage the leasing, exploration, development, and production of oil and gas resources on the Federal OCS. The statute also sets forth a number of purposes with respect to managing OCS resources. These purposes generally pertain to recognizing national energy needs and related circumstances, and to addressing these concerns by developing OCS oil and gas resources in a safe and efficient manner that provides for the following: environmental protection; fair and equitable returns to the public; State and local participation in policy and planning decisions; and resolution of conflicts related to other ocean and coastal resources and uses.

The OCS oil and gas program is overseen by the Secretary of the Interior (Secretary). The Secretary is charged with balancing orderly resource development and protection of the human, biological, and physical environments, while simultaneously ensuring that the public receives an equitable return for these resources and that free market competition is maintained. To these ends, the Secretary is empowered to grant leases to the highest qualified responsible bidder(s) on the basis of sealed competitive bids and to formulate such regulations as necessary to carry out the provisions of the OCS Lands Act. Section 18 of the OCS Lands Act requires receipt of fair market value for OCS oil and gas leases and the rights they convey. Within the USDOI, the Secretary has designated the BOEM as the administrative agency responsible for the minerals leasing of submerged OCS lands and for the supervision of offshore operations after leases are issued.

The Chukchi OCS is viewed as one of the most petroleum-rich offshore provinces in the country, with geologic plays extending offshore from some of the largest oil and gas fields on Alaska's North Slope. The BOEM's current petroleum assessment indicates a mean technically recoverable oil resource of 12 billion barrels (Bbbl) with a 5% chance of 29 Bbbl (USDOI, MMS, 2006e). The mean undiscovered gas resources total 76.77 trillion cubic feet (Tcf) with a 5% chance of 209.53 Tcf. Thus, the leasing of offshore areas within the Chukchi Sea may contribute significantly to the national energy policy.

Environmentally responsible oil and gas exploration is a critical component of our national energy policy as provided for by the OCS Lands Act. This document will supplement the information available to the department and the public regarding the potential environmental consequences of exploration and development in the Chukchi Sea relevant to Lease Sale 193.

I.B. Description of the Proposed Action

Sale 193 encompasses approximately 6,156 whole and partial blocks (about 34 million acres) within the Chukchi Sea portion of Alaska's OCS (Figure 1). Excluded from the sale is a corridor near the state's northern coast, an area of up to approximately 50 miles (mi) that is known as the polynya or spring lead system. Water depths in the majority of the sale area vary from about 95 feet (ft) to approximately 262 ft. A small portion of the northeast corner of the area deepens to approximately 9,800 ft.

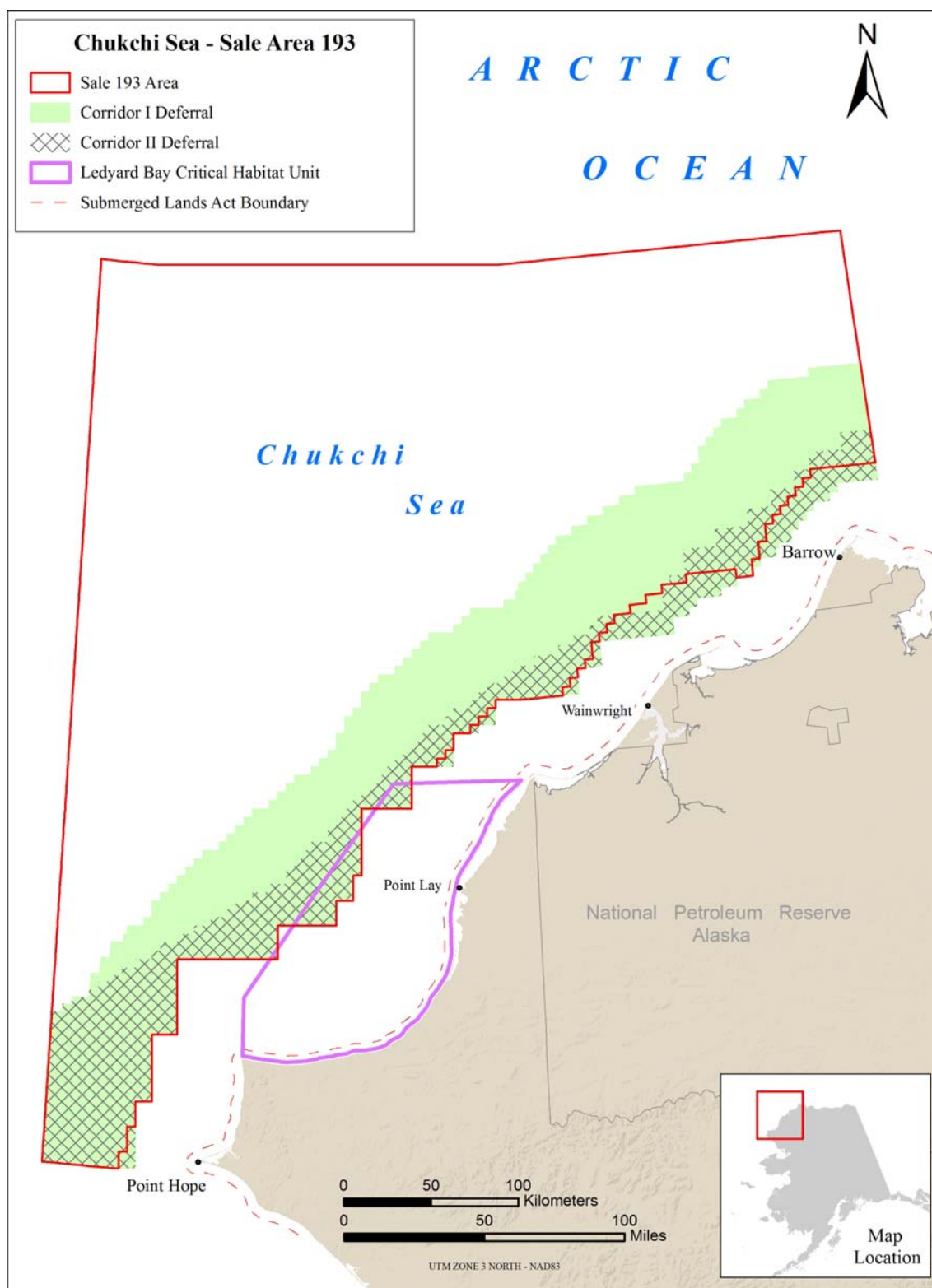


Figure 1. Sale 193 proposed action area, excluding sale blocks within a 25 mi coastal buffer (deferred in the 2007–12, 5-year program). Corridor 1 and Corridor 2 deferrals for Alternatives 3 and 4, respectively, and Ledyard Bay Critical Habitat Unit for spectacled eider are also shown.

Sale 193 was held in February of 2008. The BOEM received high bids totaling approximately \$2.7 billion and issued 487 leases. Although the lease-sale decision was challenged in the U.S. District Court for the District Court of Alaska, the litigants did not request a preliminary injunction to halt the sale. Accordingly, the sale was conducted and 487 leases were issued, covering approximately 2.8 million acres. In July 2010, the Court remanded the matter for further NEPA analysis of certain concerns. This Supplemental EIS process specifically addresses the three concerns of the Court and will provide the Secretary with sufficient information and analysis to make an informed decision among the alternatives. As Lease Sale 193 has already been held, the analysis of impacts resulting from alternatives that involve offering for lease an area larger than that offered in Sale 193 is moot, but those impacts are nonetheless considered for consistency of this analysis with the original FEIS. When the EIS process is completed the Secretary per the court's remand will affirm or change the department's previous Sale 193 decision.

I.C. Regulatory and Administrative Framework

The OCS leasing program and relevant environmental review processes are driven by a variety of Federal laws. Laws with particular relevance to this SEIS are highlighted in the following subsections. A complete treatment of the regulatory and administrative framework can be reviewed in the 193 FEIS and the most recent 5-Year Program EIS, which are available online at <http://www.boemre.gov>.

I.C.1. Outer Continental Shelf Lands Act

Under the OCS Lands Act, the Department of the Interior is required to manage the orderly leasing, exploration, development, and production of oil and gas resources on the Federal OCS, while simultaneously ensuring the following: the protection of the human, marine, and coastal environments; that the public receives a fair and equitable return for these resources; and that free market competition is maintained. The OCS Lands Act also requires coordination with affected States as well as local governments affected by OCS development activities. BOEM seeks and encourages participation from affected States and other interested parties at each procedural step leading to lease issuance.

The OCS Lands Act creates a four-stage process for planning, leasing, exploration, and production of oil and gas resources in Federal waters. Under that four-stage process, an OCS lease authorizes a lessee to engage only in “ancillary activities” that do not harm the environment pending further review and approvals (30 CFR 250.105, 250.202, and 250.209; see also, 43 U.S.C. 1340[c][approval required prior to exploration]; 43 U.S.C. 1351 [approval required prior to development and production]). The Supreme Court has recognized that “[u]nder OCSLA’s plain language, the purchase of a lease entails no right to proceed with full exploration, development, or production . . . ; the lessee acquires only a priority in submitting plans to conduct these activities” (*Secretary of the Interior v. California*, 464 U.S. 312, 339 [1984]). OCS Lands Act’s four-stage review process gives the Secretary a “continuing opportunity for making informed adjustments” in developing offshore energy resources in order to ensure all activities are conducted in an environmentally sound manner (*Sierra Club v. Morton*, 510 F.2d 813, 828 [5th Cir.1975]).

I.C.2. National Environmental Policy Act and Council on Environmental Quality

The National Environmental Policy Act (42 USC 4321 et seq.) requires Federal agencies to use a systematic, interdisciplinary approach to protecting the human environment. This approach ensures the integrated use of the natural and social sciences in any planning and decision-making that may have an impact on the environment. In furtherance of these policies, NEPA also requires Federal agencies to prepare a detailed EIS on any major Federal action that may have a significant impact on

the environment. This EIS must analyze any adverse environmental effects that cannot be avoided or mitigated, alternatives including the Proposed Action, the relationship between short-term uses and long-term productivity of the environment, and any irreversible and irretrievable commitments of resources. In 1979, the CEQ established uniform procedures for implementing NEPA. These regulations (40 CFR 1500.1–1508.28) provide for the use of the NEPA process to identify and assess the alternatives to proposed actions that avoid and minimize adverse effects to the human environment. The USDOJ regulations implementing NEPA are at 43 CFR Part 46.

I.C.3. Other Applicable Laws and Regulations

Numerous other laws, regulations, and Executive Orders apply to OCS activities. Some establish specific consultation and coordination processes with Federal, State, and local agencies. Important examples applicable to OCS activities are listed below, and are discussed in more detail in sections I.C.3 through I.C.16 of the 193 FEIS. Additional information regarding the regulatory background for this Proposed Action is available online at <http://www.boemre.gov> as well as within the most recent 5-Year Program EIS. The following is a list of laws and regulations that apply to the OCS activities.

- Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361–1421)
- Magnuson-Stevens Fishery Conservation and Management Act (MFCMA) (16 U.S.C. 1801–1883)
- Endangered Species Act (ESA) (16 U.S.C. 1531–1544)
- Oil Pollution Act (OPA) (33 U.S.C. 2701–2761)
- Clean Water Act (CWA) (33 U.S.C. 1251–1387)
- Clean Air Act (CAA) (42 U.S.C. 7401 et seq.)
- Coastal Zone Management Act (CZMA) (16 U.S.C. 1451–1464)
- Submerged Lands Act of 1953 (SLA) (43 U.S.C. 1301–1315)
- Migratory Bird Treaty Act, as amended (MBTA) (16 U.S.C. 703–712)
- National Historic Preservation Act, as amended (NHPA) (16 U.S.C. 470)
- Executive Order 12898: Environmental Justice
- Executive Order 13112: Aquatic Invasive Species
- Executive Order 13212: Actions to Expedite Energy-Related Projects
- Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

I.C.4. Land Use and Coastal Management

Land Status and Use

Land-ownership in the North Slope Borough (NSB) is complex. The Federal Government is the predominant land owner, with more than half of the Borough’s land area included within the National Petroleum Reserve-Alaska (NPR-A) and the Arctic National Wildlife Refuge (ANWR). Other major landholders include the State of Alaska, Arctic Slope Regional Corporation (ASRC), and eight Native village corporations. Under the terms of the Alaska Native Claims Settlement Act (ANCSA), the village corporations received the surface-estate rights and ASRC received the subsurface-estate rights. In NPR-A, land selection was restricted to the surface estate for village corporations and the subsurface estate was reserved for the Federal Government.

Coastal Zone Management

The Statewide standards for “uses and activities” and “resources and habitats” may be relevant to the natural gas development and production activities evaluated in this SEIS. Under the uses and

activities category, the policies relevant to Chukchi Sea natural gas development and production are coastal development, natural hazard areas, coastal access, energy facilities, utility routes and facilities, sand and gravel extraction, subsistence, and transportation routes and facilities. Under the resources and habitats category, the policies relevant to Chukchi Sea natural gas development and production are habitats; air, land, and water quality; and historic, prehistoric, and archaeological resources.

North Slope Borough District Coastal Management Plan

The NSB's coastal zone includes all State-owned submerged lands in the Beaufort and Chukchi seas. Because Federal land is excluded from the coastal zone, the Borough's inland coastal zone on the Chukchi Sea coast is limited to the Point Hope/Point Lay coastal sector, which is west of NPR-A and north of the Northwest Arctic Borough. The coastal zone boundary extends inland roughly 25 mi from the coast and along the full length of all major river corridors to include all anadromous fish spawning and overwintering habitats. Guiding the growth and development within the NSB are the NSB Comprehensive Plan and Land Management Regulations (LMRs), and the NSB Coastal Management Program (CMP).

I.C.5. Notices and Information Provided to Lessees

To encourage lessees' knowledge and appreciation of environmental resources, to inform lessees on how to avoid adverse impacts to these resources, and to provide guidance to lessees on how to fulfill the requirements of the OCS operating regulations, BOEM develops and distributes the following administrative documents. Additional information on these topics is available in section II.B.3(c) of the 193 FEIS.

Notice to Lessees

Notices to Lessees (NTLs) inform lease owners/operators that they must meet the provisions of the regulations and how they are to operate under applicable OCS operating regulations. NTLs are either applicable nationally to the OCS program or are issued by and applicable to septic regions of the OCS. The National NTLs are posted to BOEM's website at <http://www.boemre.gov/ntls/>. The Alaska Region NTLs are posted to the Alaska Region's website at <http://alaska.boemre.gov/regs/NTLS.htm>.

Information to Lessees

The Information to Lessee and Operators (ITL) provides lessees with additional information on how to mitigate potential adverse impacts from future oil and gas activities. Some ITLs provide information about issues and concerns related to particular environmental or sociocultural resources. Others provide information on how lessees might plan their activities to meet BOEM requirements or reduce potential impacts. Still other ITLs provide information about the requirements or mitigation required by other Federal and State agencies. To the extent that the ITL clauses alert and inform lessees and their contractors about mitigative measures, they are effective in lowering potential impacts. The ITLs listed below apply to all OCS activities in the Chukchi Sea and are considered part of the Proposed Action and each action alternative. Section II.B.3.c(3) of the 193 FEIS provides the full text and discussion of each ITL listed below.

- 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-Contingency 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

I.D. Prelease Processes and Activities

A full history and description of the prelease process for Sale 193 is provided in Section I.D. of the 193 FEIS. Moreover, provisions specific to leasing are found in 30 CFR 256, 30 CFR 259, and 30 CFR 260. Regulations concerning the Federal leasing of mineral resources are in relevant portions of 30 CFR 200 through 699. Provisions specific to offshore leasing programs are in Subchapter B of that title, i.e. 30 CFR 250–282.

I.E. Postlease Processes and Activities

The BOEM is responsible for regulating and monitoring the oil and gas operations on the Federal OCS. Its authority extends over all operations conducted under the lease, right of use and easement, or USDOJ pipeline right-of-way. BOEM's duties also include promoting orderly exploration, development, and production of mineral resources, while preventing harm or damage to, or waste of, any natural resource, any life or property, or the marine, coastal, or human environment. Regulations applicable to oil, gas, and sulfur lease operations on the OCS are specified in 30 CFR 250.

Regulations for geological and geophysical (G&G) exploration operations on the OCS (on unleased lands or lands under lease to a third party) are specified in 30 CFR 251. Oil-spill prevention and response rules are specified in 30 CFR 254. Note that additional regulations administered and enforced by agencies other than BOEM also apply to OCS activities. A pertinent example includes U.S. Environmental Protection Agency (USEPA) regulations (40 CFR 125) regarding discharge and pollution, as well as the myriad regulatory regimes identified in Section I.C.3., above.

The following subsections briefly describe several means through which BOEM regulates OCS post-lease activities. For a full discussion of postlease processes please refer to 193 FEIS, Section I.E. (incorporated by reference).

I.E.1. Ancillary Activities

BOEM regulations allow certain “ancillary activities” to proceed on the OCS without the requirement of a separate permit. Information from ancillary activities is required to support review and mitigation measures for OCS exploration and development plans, and applications for pipeline rights-of-way. Shallow-hazards and site-clearance surveys are used to identify and characterize potentially hazardous conditions at or below the seafloor. They also identify potential benthic biological communities (or habitats) and archaeological resources. Geotechnical activities obtain physical and chemical data on surface and subsurface sediments.

Parties seeking to conduct ancillary activities must notify the BOEM. Proposed ancillary activities are reviewed for compliance with the performance standards listed in 30 CFR 250.202(a), (b), (d), and (e).

I.E.2. Exploration Plans, and Development and Production Plans

BOEM approval is required prior to any exploration, development, or production activities within a lease block. Lessees seeking to engage in such actions must submit for BOEM review an exploration plan or a development and production plan, as appropriate. Proposed plans must include supporting information such as environmental information, an archeological report, a biological report in accordance with 30 CFR 250 (monitoring and/or live-bottom survey), and any other environmental data determined necessary. This information includes an analysis of both offshore and onshore impacts that may occur as a result of the activities. The BOEM reviews supporting information for the occurrence of geo-hazards, man-made hazards, archaeological resources, or benthic communities at the proposed activity site, and evaluates potential effects on the environment. To this end, the BOEM prepares an EA and/or EIS based on available information, which may include the geophysical report, archeological report, and air-emissions data. As part of the review process, the plan and supporting environmental information are sent to the affected State(s) for consistency review and determination with respect to that state's approved Coastal Zone Management Plan (CZMP). Proposed plans are evaluated for compliance with applicable regulations, lease stipulations, and other requirements, including the adequacy of the related oil-spill response plan.

Prior to conducting drilling operations, the operator is required to submit and obtain approval for an Application for Permit to Drill (APD). The APD must include detailed information on the seafloor and shallow seafloor conditions of the drill site and detailed information about the drilling program for BOEM's evaluation of operational safety and pollution-prevention measures. The lessee must specify the best available and safest technology that will be used to minimize the potential for uncontrolled well flow.

I.E.3. Pipeline Regulations

Regulatory authority over pipelines on the OCS and in coastal areas is shared by several Federal Agencies, including USDOJ (which includes BOEM), the U.S. Department of Transportation, the U.S. Army Corps of Engineers, the Federal Energy Regulatory Commission, and the U.S. Coast Guard. The U.S. Fish and Wildlife Service (FWS) also reviews applications for pipelines that are near certain sensitive biological communities.

The BOEM regulations pertaining to pipelines are found at 30 CFR 250.1000–250.1019. Pipeline-permit applications to BOEM include the pipeline location drawing, profile drawing, safety schematic drawing, pipe-design data to scale, a shallow-hazard-survey report, and an archaeological report. The BOEM evaluates the design and fabrication of the pipeline and prepares an analysis of potential environmental impacts in accordance with applicable policies and guidelines. The BOEM prepares an EA and/or an EIS on all pipeline rights-of-way that go ashore. No pipeline route will be approved by BOEM if any bottom-disturbing activities (from the pipeline itself or from the anchors of lay barges and support vessels) encroach on biologically sensitive areas. The operators are required to periodically inspect their routes by methods prescribed by the BOEM Regional Supervisor for any indication of pipeline leakage. Some examples of pipeline monitoring techniques include visual monitoring, comparing the volume of product entering and exiting the pipeline, in-line inspection tools (smart pigs), external hydrocarbon-vapor detection (leak-detection system), and pressure analysis. Monthly overflights are also conducted to inspect pipeline routes for leakage. Pipelines may be abandoned in place if they do not constitute a hazard to navigation and commercial fishing, or unduly interfere with other uses of the OCS.

I.E.4. Best Available and Safest Technology Requirements

To ensure that all oil and gas exploration, development, and production activities on the OCS are conducted in a safe and pollution-free manner, the OCS Lands Act requires that all OCS technologies and operations use the best available and safest technology that the Secretary determines to be economically feasible. These include requirements for state-of-the-art drilling technology, production-safety systems, well control, completion of oil and gas wells, Oil Spill Response Plans (OSRPs), pollution-control equipment, and specifications for platform/structure designs.

I.E.5. BOEM Technical and Safety Review

The lessee must design, fabricate, install, use, inspect, and maintain all platforms and structures on the OCS to ensure their structural integrity for the safe conduct of operations at specific locations. Applications for platform design and installation are filed with BOEM for review and approval.

Production-safety equipment used on the OCS must be designed, installed, used, maintained, and tested in a manner that ensures the safety and protection of the human, marine, and coastal environments. All tubing installations open to hydrocarbon-bearing zones below the surface must be equipped with safety devices that will shut off the flow from the well in the event of an emergency, unless the well is incapable of flowing. All surface production facilities must be designed, installed, and maintained in a manner that provides for efficiency, safety of operations, and protection of the environment.

I.E.6. Oil-Spill-Response Plans

In compliance with 30 CFR 254, all owners and operators of oil-handling, -storage, or -transportation facilities located seaward of the coastline must submit an OSRP to BOEM for approval. Owners or operators of offshore pipelines are required to submit a plan for any pipeline that carries oil, condensate that has been injected into the pipeline, or gas with naturally occurring condensate. Pipelines carrying essentially dry gas do not require a plan. A response plan must be submitted before an owner/operator can use a facility. To continue operations, the facility must be operated in compliance with the approved plan.

A BOEM-approved OSRP must to be reviewed and updated every two years. Revisions to a response plan must be submitted to BOEM within 15 days whenever (1) a change occurs that significantly reduces an owner/operator's response capabilities; (2) a significant change occurs in the worst-case-discharge scenario or in the type of oil being handled, stored, or transported at the facility; (3) there is a change in the name or capabilities of the oil-spill-removal organizations cited in the plan; or (4) there is a significant change in the appropriate Area Contingency Plans.

I.E.7. BOEM Inspection Program

Under the direction of the OCS Regional Office in Anchorage, Alaska, the BOEM inspection program for Alaska provides review and inspection of oil and gas operations. The BOEM conducts on-site inspections to ensure compliance with lease terms, Notices to Lessees, and approved plans, and to ensure that safety and pollution-prevention requirements of regulations are met. These inspections involve items of safety and environmental concern. Further information on the baseline for the inspection of lessee operations and facilities can be found in the *National Potential Incident of Noncompliance List* (USDOJ, MMS, 2005c). If an operator is found in violation of a safety or environmental requirement, a citation is issued. Depending on the nature of the violation, actions can range from requiring that the violation be fixed within 14 days (for minor violations) to immediate suspension of production or other operations (for violations that pose a threat of serious or immediate harm or damage to the marine, coastal, or human environment).

The purpose of the inspection program is to ensure that an oil and gas facility complies with the regulations and that the lessee is conducting operations in accordance with the regulations and

approved permit. The Alaska Region conducts inspections of existing development and production facilities 3–4 times a year. The Alaska Region will conduct on-site inspections of all critical operations, including testing of blowout preventer (BOP) equipment, running and cementing casing, and well testing. The Alaska Region has the authority and will issue an incident of non-compliance (INC, a documented and recordable action) when a violation is found and can shut-in any activity that is not in compliance with regulations or the approved permit. An activity that has been issued an INC or shut-in may not restart until the Alaska Region has inspected and confirmed that the non-compliance resulting in INC or the shut-in has been properly corrected.

I.E.8. Structure Removal and Site Clearance

Lessees/operators have one year from the time a lease is terminated to remove all wells and structures from a lease (30 CFR 250.1700–250.1754). The BOEM requires lessees to submit a procedural plan for site-clearance verification. Lessees must ensure all objects related to their activities were removed following termination of their lease.

I.E.9. Training Requirements for Offshore Personnel

Proper training is important for ensuring that offshore oil and gas operations are carried out in a manner that emphasizes operational safety and minimizes the risk of environmental damage. Offshore personnel also are required to have well control and production safety training (30 CFR 250.1500).

I.F. New Information and Analysis provided by this Draft Supplemental EIS

Chukchi Sea Lease Sale 193 was held in February 2008, with BOEM accepting high bids of approximately \$2.7 billion and issuing 487 leases for approximately 2.8 million acres. As a result of a lawsuit challenging the sale, the U.S. District Court for the District of Alaska remanded Sale 193 for further NEPA analysis of three concerns.

First, the District Court found that BOEM’s NEPA process lacked sufficient analysis on the “environmental impacts of natural gas developments, despite industry interest and specific lease incentives for such development.” In accordance with the District Court remand, this Draft SEIS provides in-depth analysis of the most viable natural gas development and production scenario for Chukchi leases.

The second and third concerns both stem from the District Court’s finding of procedural deficiencies in BOEM’s treatment of missing or incomplete information within the 193 FEIS. The District Court held that in order to comply with 40 CFR 1502.22, BOEM must determine whether missing information is relevant or essential, and whether the cost of obtaining the missing information is exorbitant, or the means of doing so unclear. Appendix A of this Draft SEIS catalogues BOEM’s Section 1502.22 evaluation of all statements within the 193 FEIS that identified incomplete, missing, or unavailable information.

In conducting this extensive evaluation effort, BOEM analysts determined that while many items of incomplete, missing, or unavailable information were broadly relevant to the important issues at hand, none were essential for a reasoned choice among alternatives. There were several reasons why the missing information cited was not deemed essential. Those reasons were inherent in the information collection and evaluation process and were therefore often common to many instances where missing information was noted. These reasons are listed below and explained in detail in Appendix A.

Recurring reasons why missing information is not essential to a reasoned choice among alternatives under 40 CFR 1502.22 include:

- The availability of sufficient information to support sound scientific judgments and reasoned managerial decisions, even without the identified incomplete, missing, or unavailable information.
- The presumption that adverse effects would certainly occur under the specific circumstance to which the incomplete information applies. For instance, significant adverse effects are presumed if marine mammals are contacted by a large oil spill; it may not be essential to understand every potential physiological mechanism (for instance, potential impacts to the function of a whale's blowhole) through which these adverse effects may occur.
- The commonality of potential impacts and their severity among all action alternatives, which substantially reduced the utility of incomplete information to the decision-maker.
- The existence of other environmental laws and regulations that would preclude significant adverse effects on particular resources.
- The understanding that certain items of presently missing or incomplete information will be known (and utilized to avoid or minimize adverse impacts) at a later stage of OCS Lands Act environmental review, when the information could potentially become essential.

Chapter II. Alternatives, Mitigation Measures, and Issues in the 193 FEIS

II.A. Sale 193

The Secretary's Final OCS Leasing Program for 2007–2012 identifies certain areas of the Chukchi Sea Planning Area as suitable for lease for the development of offshore oil and gas resources. In February of 2008, the BOEM held Chukchi Sea Lease Sale 193, and leased approximately 2.8 million acres in the Chukchi Sea Planning Area. In July 2010, however, the U.S. District Court for the District of Alaska issued a remand order requiring BOEM to undertake additional NEPA analysis of certain issues. The additional analysis is provided by this Supplemental EIS process. Upon reviewing the Final SEIS, the Secretary will select one of the four alternatives outlined below, which could reaffirm, cancel, or modify Sale 193.

The 2007–2012 Five Year Leasing Program has been the subject of litigation in the U.S. Court of Appeals for the District of Columbia (*Center for Biological Diversity v. DOI*, Nos. 07-1247, 07-1433 [D.C. Cir.]). Pursuant to D.C. Circuit Court remand, on March 31, 2010, the Secretary of the Interior issued the Preliminary Revised Program leaving Sale 193 in the 2007–2012 5-Year Oil and Gas Leasing Program. To date, the Secretary has not made a decision on the Final 5-Year Oil and Gas Leasing Program for 2007–2012.

II.B. Alternatives

After comprehensive scoping, Draft EIS, and public and agency commenting processes, BOEM in June 2007 released the “Final Environmental Impact Statement for Oil and Gas Lease 193 and Seismic-Surveying Activities in the Chukchi Sea” (193 FEIS) (USDOl, MMS, 2007). The alternatives analyzed in the 193 FEIS are carried forward for consideration in this Draft SEIS. As Lease Sale 193 has already been held consistent with Alternative IV, but the impacts under each alternative are nonetheless considered for consistency of this analysis with the analysis in the 193 FEIS.

II.B.1. Alternatives Carried Forward in the Draft Supplemental EIS

Alternative I (Proposed Action)

The Proposed Action offers for lease 6,156 whole or partial blocks within in the Chukchi Sea. This area covers approximately 34 million acres. Specifically excluded from the Proposed Action is the 25 Statute Mile Buffer implemented by the Secretary in Final OCS Leasing Program for 2007–2012. By selecting Alternative I, the Secretary would elect to offer for lease all 34 million acres of the Chukchi Sea made available by the Final OCS Leasing Program for 2007–2012.

Alternative II (No Lease Sale)

This “no action” alternative is equivalent to not reaffirming Chukchi Sale 193. The opportunity to develop oil and gas resources that could have resulted from the Proposed Action would be precluded or postponed, as would any potential environmental impacts associated with the other alternatives.

Alternative III (Corridor I Deferral)

This alternative is the Proposed Action minus a corridor extending 60 mi offshore along the coastward edge of the proposed sale area to protect important bowhead whale habitat used for migration, feeding, nursing calves, and breeding. Alternative III would offer approximately 1,765 whole or partial blocks comprising 9.1 million acres (3.7 million hectares). The deferral of “Corridor I” would result in a reduction of 36% of the commercial resources opportunity index from the Proposed Action (see Table IV.A-3 in the 193 FEIS). Should the Secretary select Alternative III,

portions of Chukchi Sale 193 could be affirmed, but leases issued on tracts within Corridor I would be affected.

Alternative IV (Corridor II Deferral) (Agency Preferred Alternative)

This alternative is the Proposed Action, excluding approximately 795 whole or partial blocks along the coastward edge of the sale area. The “Corridor II” deferral area is a subset of the Corridor I deferral area analyzed under Alternative III. This alternative was identified as the Agency’s Preferred Alternative in the 193 FEIS, and was offered for lease as Sale 193 (February 2008). Selection of Alternative IV would be equivalent to affirming Sale 193 as held.

II.B.2. Alternatives Considered But Not Analyzed

A full discussion of alternatives considered within the overall EIS process but not carried forward for detailed analysis is available in Section II.B.2 of the 193 FEIS. BOEM has not identified any additional alternatives as a result of the addition of a natural gas development and production scenario in this Draft SEIS, beyond those already considered in the 193 FEIS.

II.C. Mitigation Measures and Issues

II.C.1 Mitigation Measures

Activities under each alternative would be subject to a variety of mitigation measures. More detailed discussion of applicable mitigation measures is available in section II.B of the 193 FEIS. BOEM has not identified any additional mitigation measures specific to the natural gas development and production evaluated in this Draft SEIS. Most pertinent to the analysis of mitigation measures are the binding and enforceable measures known as lease stipulations, described below.

Lease Stipulations

In addition to selecting one of four alternatives, the Secretary would also select lease stipulations to govern activities within the leasehold. This Draft SEIS analyzes seven standard lease stipulations that could apply under each action alternative. Section II.B.3.c(1) of the 193 FEIS provides the full text of these stipulations and an analysis of the expected effectiveness of each stipulation at mitigating adverse effects. All seven of the stipulations (listed below) were selected by the Secretary and incorporated into the leases resulting from Sale 193 (February 2008).

- Protection of biological resources
- Orientation program
- Transportation of hydrocarbons
- Industry site-specific monitoring for marine mammal subsistence resources
- Conflict avoidance mechanisms to protect subsistence whaling and other subsistence-harvest activities
- Pre-booming requirements for fuel transfers
- Measures to minimize effects to spectacled and Steller’s eiders from exploration drilling

II.C.2 Issues

The major issue framing the environmental analysis within this Draft SEIS is the District Court’s remand of Sale 193 for analysis of natural gas production. Issues related to OCS activities have been identified through many years of scoping for Alaska OCS lease sale evaluations, the 193 EIS process, and additional review conducted for this Draft SEIS. A brief summary of identified issues related to the analysis of natural gas production is provided below. A comprehensive discussion of issues related to Sale 193 is available in Section II.B.5 of the 193 FEIS.

Subsistence

There is potential for onshore pipelines and other infrastructure associated with offshore Chukchi Sea development to impact the Western Arctic (caribou) Herd and subsistence use of the herd.

Bowhead Whale

Commenters expressed concerns over the impacts that OCS activities may have on the bowhead whale and their migration patterns.

Marine Mammals

Commenters noted the potential for exploration and development activities to impact areas known to be critical to the subsistence harvest of marine mammal.

Water Quality Degradation

Issues related to water quality degradation included operational discharges, domestic wastes, sediment disturbance, and discharges from service vessels.

Structure and Pipeline Placement

Some of the concerns expressed related to structure and pipeline emplacement, lighting issues with platforms, bottom area disturbances from bottom-founded structures or anchoring, and construction of onshore infrastructure.

OCS-Related Support Services, Activities, and Infrastructure

Concerns were expressed over activities related to support of OCS operations, including vessel and helicopter traffic and emissions.

Sociocultural and Socioeconomic

Concerns include employment impacts, cultural impacts, and population fluctuations.

Environmental Resources

Resources analyzed in the 193 FEIS are carried forward for analysis within this Draft SEIS. No additional resources were identified for the analysis of gas development and production. The following resources were analyzed:

- Water Quality
- Air Quality
- Lower-Trophic-Level Organisms
- Fish Resources
- Essential Fish Habitat
- Threatened and Endangered Species
- Marine and Coastal Birds
- Marine Mammals
- Terrestrial Mammals
- Vegetation and Wetlands
- Economy
- Subsistence-Harvest Patterns
- Sociocultural Systems
- Archaeological Resources

II.C.3. Issues Considered But Not Analyzed

The 193 FEIS provides a discussion of issues considered but not carried forward for further analysis (Section II.B.5.B of the 193 FEIS). All comments received in response to the Call for Information and Notice of Intent to Prepare an EIS, as well as those received during public scoping meetings, are part of the record of information used in developing the 193 EIS, and were summarized and made available to the decision-makers during the deliberation process. Several issues raised during scoping for the 193 EIS were not considered for detailed study in the EIS, because they were out of the scope of the EIS or inherently did not affect the environmental analyses. These issues include administrative, policy, or process issues.

No additional public scoping was conducted for this SEIS. The BOEM did review the comments received on the 193 Draft EIS as well as those on the Arctic Multiple-Sale Draft EIS (USDOJ, MMS, 2008) to identify issues relevant to the analysis of gas production for the Chukchi Sea OCS. Through this process, BOEM identified two additional issues which are addressed in the SEIS (the potential for hydrogen sulfide (H₂S) and related effects and the potential effects of a gas release accident).

The BOEM has considered and “scoped out” the issues below from detailed analysis in this SEIS.

Tanker transport of produced natural gas (tanking of liquefied natural gas or LNG). The remand ordered by the U.S. District Court for the District of Alaska requires BOEM to analyze the environmental impact of natural gas development in the Chukchi Sea. To determine the appropriate gas development and production scenario in this SEIS, BOEM Alaska OCS Region’s Office of Resource Evaluation evaluated three possible gas export strategies for the Chukchi OCS based on a current understanding of the geologic, engineering, economic, and political issues.

The first strategy consisted of transport via pipeline. Although different ways to transport gas from the North Slope have been discussed (ICF, Inc., 1982; Booz, Allen and Hamilton, 1983; GAO, 1983; Thomas et al., 1996; Sherwood and Craig, 2001), the most common conceptual plans involve a large-diameter, overland gas pipeline running south from the Prudhoe Bay area. Pipelines are the most cost-effective way to transport large volumes of oil or gas to market if overland routes are feasible. At the present time (August 2010), work on several gas pipeline projects is progressing, but none of the projects have been approved or funded. Ongoing work by several competing gas pipeline projects increases the options for a gas project but also increases the uncertainties regarding the completion timing, route location and capacity of the final project(s). Gas development in the Chukchi OCS would require a long (approximately 300 mile) overland pipeline across the NPR-A to connect to the new gas pipeline. The pipeline might be built in sections as gas development expands westward across NPR-A. Gas development in the Chukchi OCS could reverse this situation, where a large gas field in the Chukchi supports a large overland gas pipeline to Prudhoe Bay. This way, the remote gas resources from the Chukchi could promote the development of marginal gas pools stranded in NPR-A. In either case, gas development in NPR-A and the Chukchi would be important to a future North Slope gas pipeline where the huge investment (>\$ 30 billion) is based on a long-term (> 25 year) project.

LNG is a second possible means to export gas from the Chukchi OCS, but is a less likely alternative. LNG operations will face difficult economic, technical, and regulatory challenges because it is a new concept to the region. LNG operations require expensive infrastructure, including pipelines, a large processing facility, a marine loading terminal, a fleet of LNG tankers, and receiving terminals at market destinations. Numerous feasibility and environmental issues will be present for each of these components in the LNG delivery chain. Marine transportation in the Arctic is restricted by sea-ice conditions that could inhibit tanker loadings and transits for 6 months of the year. No LNG ships have been built to handle severe ice conditions common in the Chukchi. Nearshore areas are relatively shallow and water depth could limit the size of LNG ships (loaded draft of 40 ft, (12 m)).

A third strategy for gas development involves offshore processing, storage and loading to marine tankers for export. Bottom-founded production platforms in the Chukchi Sea will be very large to resist ice forces in relatively deepwater areas (greater than 100 ft). Because of their large size, platforms could be designed with internal storage compartments to hold oil or gas. Offshore loading and tanker traffic will be affected by rough seas in the open-water season (July-November) and severe sea ice conditions during the rest of the year. This strategy would face numerous economic, engineering, and regulatory challenges.

The BOEM concludes from the analysis summarized above that a pipeline export system is the most likely scenario for transportation of natural gas development in the OCS areas off northern Alaska.

The community of Wainwright wants natural gas produced from the Chukchi Sea OCS to be made available to the community for power generation. This issue is beyond the scope of the current analysis. A contract between two parties (the gas producer and Wainwright) cannot be required or enforced by the Federal Government.

Consideration of New Information from the 2010 Deepwater Horizon Oil Spill in the Gulf of Mexico. In accordance with the CEQ's report (CEQ, 2010), BOEM considered whether new information from the Deepwater Horizon incident requires evaluation in this SEIS. In doing so, BOEM remained cognizant of the specific circumstances driving this Supplemental process. The U.S. District Court for the District of Alaska instructed BOEM to address three concerns, as follows:

- Analyze the environmental impact of natural gas development.
- Determine whether missing information identified by BOEM in the 193 FEIS was essential or relevant under 40 CFR 1502.22.
- Determine whether the cost of obtaining the missing information was exorbitant, or the means of doing so unknown.

In responding to the first remanded concern, BOEM's Resource Evaluation Section developed a reasonable natural gas development and production scenario to frame the environmental analysis. This scenario assumes that natural gas development and production is only feasible if it follows the oil exploration, development, and production activities analyzed in the 193 FEIS. Natural gas development and production as addressed in this SEIS does not pose any risk of a large oil spill because the oil reservoir would be depleted before full natural gas production is established. No additional exploration or development drilling would be necessary for natural gas development and production. Even if the remand were interpreted to require reconsideration of potential impacts related to production of oil, the current information available on the DWH spill would not require additional analysis in this supplemental EIS because (1) unlike the Gulf of Mexico, the DWH has not changed the baseline environmental conditions in the Chukchi Sea Planning Area, (2) the Chukchi Sea Planning Area is predominately shallow water, and (3) any change in likelihood of an oil spill from a blowout during exploration drilling would not alter the potential effects of the oil spill already analyzed.

The BOEM concludes that new information regarding the Deepwater Horizon incident is not relevant to the analysis of natural gas development and production in the Chukchi Sea OCS, and that analysis of a maximum credible oil spill is not within the scope of the Court's remand.

Greenhouse Gas Emissions from Consumption of Produced Natural Gas. The NEPA requires Federal Agencies to consider and discuss in EISs any environmental impact associated with their actions, if there is a reasonably close causal relationship between the environmental effect and the alleged cause. Under NEPA's rule of reason, BOEM draws a manageable line between the impacts associated with producing natural gas and the impacts associated with consumption of the natural gas. The USDOJ has the authority to regulate the location and manner of resource production; therefore, it is appropriate to attribute production-related impacts to the Agency's authorizing "action." Because

the USDOJ lacks any direct authority to promote or reduce consumption of commodity oil and gas, it is not appropriate under NEPA to consider the cascade of environmental impacts that might flow from such consumption. Those impacts are more properly attributed to market demand and other government actions more directly concerned with managing or controlling demand.

Section 18(a) of the OCS Lands Act, 43 U.S.C. § 1344(a), requires the USDOJ to consider the risk of localized environmental harm to leasing areas due to exploration and development activities. The Act requires the USDOJ to ensure that oil and gas would be extracted in a responsible manner and to identify or develop measures to eliminate or minimize the risks “attendant to that exploration and development.”

II.D. Summary of Environmental Impacts

This Section briefly summarizes the detailed impact analyses of both the 193 FEIS and this Draft SEIS. Conclusions from each document are presented by alternative, and for each resource area potentially affected under that alternative. For each resource subsection, the potential impacts associated with oil exploration, and development and production (including potential effects from a large accidental oil spill) are discussed first. This includes discussion of routine activities as well as potential impacts from the unlikely event of a large oil spill. Oil-related impacts are summarized from the 193 FEIS.

Each resource subsection also includes a summary of the potential impacts of natural gas development. These conclusions are derived from Chapters 4 and 5 of this 193 Draft SEIS. As will be explained in more detail within Chapter 4, the 193 Draft SEIS’ impact analysis is predicated on the most viable natural gas development and production scenario that could result from Sale 193. This scenario assumes that any natural gas development and production would utilize an existing (due to oil development and production) platform located near the center of the Sale 193 area. This is the same platform location as was assumed and analyzed in the 193 FEIS. This is the same platform location as was assumed and analyzed in the 193 FEIS. The gas development and production scenario would also utilize the existing shorebase, and run new offshore and onshore gas pipelines along the same corridor as the existing oil pipelines. This same scenario applies under each action alternative analyzed in this Draft SEIS. A more detailed explanation of how BOEM developed this natural gas development and production scenario is provided in Section IV.B. of this Draft SEIS. Since hypothetical locations of all infrastructure (including the production platform, wells, both offshore pipelines, shore base, and both onshore pipelines) remain constant under the three action alternatives, potential impacts are similar under each action alternative. Due to these similarities, and for the sake of brevity, discussion of the potential impacts under each action alternative area are often grouped together.

However, the potential natural gas development and production impacts under each action alternative analyzed are not necessarily identical. Alternatives 3 and 4 each include deferral areas that would exclude from the lease sale notable portions of the coastward edge of the Chukchi Planning Area. If the decision maker were to select Alternative 3 or 4, no wells or platforms could be constructed within the applicable deferral area. Deferring certain areas from consideration could in this sense affect the type and severity of potential environmental impacts. Coastal areas can be particularly sensitive to potential impacts to marine mammals, marine and coastal birds, subsistence, and other valued environmental resources. Increasing the minimum distance between certain potential development and production activities and the Chukchi coastline could potentially benefit several resources in a general way. As was the case with the oil scenario analyzed in the 193 FEIS, any differences in the potential environmental impacts associated with gas development and production under each action alternative analyzed are directly traceable to the size and location of proposed deferrals.

II.D.1. Summary of Impacts: Alternative I – Proposed Action

Water Quality

Oil Exploration, Development, and Production

The effect of the Proposed Action on water quality as a result of exploration, development, and production is expected to be moderate locally and low regionally, because discharges into the marine environment would be permitted and regulated by USEPA. Risk of a large oil spill affecting water quality is expected to be low, both locally and regionally, as a result of preventative measures (see 193 FEIS, p. IV-38).

Natural Gas Development and Production

Neither natural gas development nor production is expected to cause significant adverse impacts to water quality. Temporary and localized adverse effects are likely to result from installation of a new offshore natural gas pipeline and from small scale and infrequent deck drainage discharges. The effect of these activities on regional water quality would remain very low.

Air Quality

Oil Exploration, Development, and Production

Proposed actions would comply with Federal and State of Alaska air quality and emissions requirements. As a result, the effect of the Proposed Action on air quality is expected to be low and air quality to remain well within National Ambient Air Quality Standards and Prevention of Significant Deterioration incremental limits.

Natural Gas Development and Production

Minor adverse impacts to air quality would occur from the emissions of machines and generators generally associated with development and production activities. However, any increase in concentrations of criteria pollutants from these activities would be small, local, and temporary. Overall effects would be low and would not exceed any Clean Air Act standards. Natural gas development and production would result in a negligible contribution to U.S. and global greenhouse gas emissions.

Lower-Trophic-Level Organisms

Oil Exploration, Development, and Production

The level of effect on lower trophic-level organisms with standard mitigation would be minor, with moderate impacts near drilling locations and from trenching for pipeline installation. A large oil spill contacting the coast could persist in tidal and sub-tidal sediments for tens of years with moderate effects to local lower-trophic communities.

Natural Gas Development and Production

Several components of the natural gas development scenario, such as installing an offshore gas pipeline and anchoring vessels, have the potential to impact lower trophic-level organisms. However, these impacts would be localized and temporary, given the expectation of eventual recolonization. As a result, no adverse impacts to lower trophic level organisms are expected to result from natural gas production. Overall no significant adverse effects to this resource would occur.

Fish Resources

Oil Exploration, Development, and Production

Construction activities are anticipated to result in temporary and/or localized adverse impacts to fish and fish habitats, with recovery expected to occur in fewer than three generations. A large oil spill

contacting intertidal or estuarine habitats used by fishes potentially could result in significant adverse impacts to some local breeding populations. Recovery to former status by dispersal from nearby population segments would require more than three generations. The impact would not be significant at the population level.

Natural Gas Development and Production

Several types of direct and indirect impacts would occur as a result of the natural gas development and production scenario. Direct impacts, however, would be minimized by the ability of many fish to avoid disturbance and flee from areas of high noise. Indirect impacts would occur to seafloor habitat from pipeline installation and anchoring. These effects cannot be avoided, but would likewise remain localized, temporary, and minor. Consequently, no significant adverse effects would occur.

Essential Fish Habitat

Oil Exploration, Development, and Production

Seismic surveys conducted in association with the proposed lease sale would have minor adverse impacts on EFH. Construction-related disturbance is also expected to result in minor adverse impacts to freshwater and marine salmon EFH. A large oil spill or chronic small-volume oil spills impacting intertidal or estuarine habitats used by early life-history stages of Pacific salmon would be likely to result in significant adverse effects on local populations. These would require three or more generations to recover to their former status.

Natural Gas Development and Production

No additional impacts to Essential Fish Habitat are expected to result from continued production activities, although in the event of a large-scale natural gas release, the chemical and physical water column environment of arctic cod Essential Fish Habitat would be affected temporary to short-term and at a negligible to minor level.

Threatened and Endangered Marine Mammals

Oil Exploration, Development, and Production

Overall, bowhead whales exposed to noise-producing activities such as vessel and aircraft traffic, drilling operations, seismic surveys, and construction activities would be likely to experience temporary, nonlethal effects. It is unlikely that fin and humpback whales would be adversely affected by noise-causing oil and gas activities in the Proposed Action area. Prolonged exposure to freshly spilled oil could cause adult whale mortalities, but based on available information, the number likely would be small if the spill contacted bowheads in open water. If a large amount of fresh oil contacted a significant portion of a large aggregation of bowheads, especially with a high percentage of calves, effects could be greater than under more typical circumstances, potentially rising to population-level adverse effect. Significant impacts to polar bears would only occur during the unlikely event of a large oil spill.

Natural Gas Development and Production

Potential impacts to listed whales from natural gas development and production would be similar to those anticipated for oil development and production. No additional exploration or drilling activities would take place during the natural gas scenario, and the potential for a large oil spill would no longer exist. Natural gas development and production could result in increased noise and disturbance to bowhead as well as fin and humpback whales. Bowhead, fin and humpback whales exposed to noise-producing activities such as vessel and aircraft traffic, construction activities, and production activities most likely would experience temporary, nonlethal effects. There is variability in whale response to certain noise sources; this variability appears to be context specific (e.g., feeding versus

migrating whales) and also may be related to reproductive status and/or sex or age. Overall impacts are expected to be minor.

Various aspects of the natural gas development and production scenario have the potential to disturb polar bears, but any impacts would be temporary, most likely non-lethal, and would not rise to the level of significance. It should also be noted that additional Section 7, ESA consultation would be required before BOEM approves any Development and Production Plan that could follow from a lease sale. Under the current regulatory framework, Incidental Take Authorization under the MMPA would satisfy consultation requirements under the Endangered Species Act. That process would identify and require any additional, site-specific mitigation deemed necessary by FWS to avoid jeopardy to polar bears or adverse modification of critical habitat.

Other Marine Mammals

Oil Exploration, Development, and Production

Effects of full-scale industrial development of the waters of the Chukchi Sea likely would accumulate through displacement of marine mammals from their preferred habitats, increased mortality, and decreased reproductive success. Significant impacts could occur to belugas and/or walrus in the event of a large oil spill.

Natural Gas Development and Production

While the complexity of how marine mammal species react to underwater and above water sound renders an exact determination of potential adverse impacts difficult, abundant regulatory review and careful design of mitigation measures are expected to preclude instances of level A, or “harm” take of marine mammals and to reduce the potential for level B or “harassment” take. No population-level impacts are anticipated as a result from natural gas development and/or production.

Threatened and Endangered Marine and Coastal Birds

Oil Exploration, Development, and Production

Disturbance, collision hazards, and oil/toxic pollution could result in the taking of threatened Steller’s and spectacled eiders. Without comprehensive mitigation measures to avoid or minimize potential impacts, these activities are likely to adversely affect Steller’s and spectacled eiders. Similarly, disturbance and oil/toxic pollution could result in the taking of Kittlitz’s murrelet, a candidate species. Without comprehensive mitigation measures to avoid or minimize potential impacts, these activities may affect the Kittlitz’s murrelet. OCS activities in the Ledyard Bay Critical Habitat Unit (LBCHU) could result in physical modification of seafloor habitats and decrease use of the LBCHU by molting spectacled eiders. Without comprehensive mitigation measures to avoid or minimize potential impacts, physical modification of the LBCHU seafloor would adversely modify the LBCHU.

Natural Gas Development and Production

The natural gas development and production scenario analyzed in this SEIS is comprised of activities that are very similar or even identical to those analyzed in the preceding FEIS, and does not include some of the higher-risk activities (i.e. seismic surveying and exploration, platform construction, oil production). In this sense, one can expect natural gas-related impacts to be a continuation of the potential adverse environmental impacts associated with the oil development and production activities analyzed in the FEIS. The FEIS as well as each BO found notable potential for adverse impacts to Threatened and Endangered marine and coastal birds, but also explained that many of these potential impacts would be avoidable through avoidance and mitigation. It is reasonable to presume that through development of additional, site-specific mitigation measures during later environmental review processes, the new activities associated with the gas scenario (namely installing and operating an offshore gas pipeline, expanding an onshore facility, and installing and operating an onshore gas pipeline through NPR-A), would produce only minor impacts to Threatened and Endangered marine

and coastal birds. No significant impacts are expected from any potential releases of natural gas. Significant adverse effects could occur from extending the life of the platform and other facilities, should high numbers of Threatened or Endangered birds from declining populations suffer mortality from collisions. Additional discussion on the types of impacts that could affect marine and coastal birds generally is provided in the section below.

Other Marine and Coastal Birds

Oil Exploration, Development, and Production

Marine and coastal birds could be adversely affected by OCS activities through disturbances, collisions, habitat loss, petroleum exposure, and exposure to toxic contamination. Several areas in the Chukchi OCS are historically documented to be important to marine and coastal birds, and several species or species-groups have a high probability of experiencing substantial negative impacts. The risk that several regional bird populations could experience significant adverse impacts is also high. Spilled oil has the greatest potential for affecting large numbers of birds. Most notably, a large spill could impact common and thick-billed murres in late summer and early fall, when juveniles have not yet developed the ability to fly and attendant males are flightless for several weeks while molting. This inability to move quickly out of the area, coupled with the potential for affecting large numbers of birds, could lead to a sharp decrease in murre abundance at the Cape Thompson and Cape Lisburne colonies.

Natural Gas Development and Production

As marine and coastal bird use presence is quite variable by season and location, an accurate assessment of impacts at this early stage is difficult. Additional NEPA and other environmental review processes occurring at later stages of the OCS Lands Act program (i.e. exploration, development and production) will have site-specific plans to focus an analysis. Significant adverse impacts to marine and coastal birds would be avoided and mitigated through restriction and measures implemented during those later review processes.

Terrestrial Mammals

Oil Exploration, Development, and Production

Among the terrestrial-mammal populations that could be affected by oil exploration and development in the Sale 193 area are caribou of the Central Arctic (CAH), Western Arctic (WAH), and Teshekpuk Lake caribou (TCH) herds; muskoxen; grizzly bears; and arctic foxes. The primary potential effects of OCS exploration and development activities on terrestrial mammals would come from disturbance associated with ice-road and air-support traffic along pipeline corridors and near other onshore-support facilities. Habitat alteration associated with gravel extraction (mining) to support the construction of offshore gravel islands and gravel pads for onshore facilities is possible. Effects could also come from potential oil spills contacting coastal areas used by caribou for insect relief, and for scavenging by grizzly bears and arctic foxes. The effects of Chukchi Sea oil exploration and development on caribou, muskoxen, and grizzly bears would likely include local displacement within about 4 km of onshore pipelines and roads. If a large oil spill occurred in the Chukchi Sea, it likely would result in the loss of a small number of caribou, muskoxen, grizzly bears, and arctic foxes. However, significant impacts to local grizzly bear populations could occur if a large oil spill affected one of the salmon-spawning rivers in the project area.

Natural Gas Development and Production

It is likely that several species of terrestrial mammals would be temporarily disturbed by natural gas development, and to a lesser extent, natural gas production activities. Negative impacts of this type can be difficult to quantify. However, existing data and anecdotal evidence strongly suggest that no species of terrestrial mammal would suffer significant adverse impacts.

Vegetation and Wetlands

Oil Exploration, Development, and Production

Seismic surveys and exploration activities would be concentrated offshore, with no impacts on onshore and inland vegetation and wetlands. The level of effects on wetlands and terrestrial vegetation communities resulting from oil development and production would likely be localized. These impacts would be moderate to significant at a local scale, especially if a large spill occurred, but would have a small effect on the ecological functions, species abundance, and composition of wetlands and plant communities of the North Slope at a regional scale.

Natural Gas Development and Production

Given the unique sensitivity of the tundra ecosystem in the region analyzed, some potential impacts to vegetation associated with natural gas development and production may be long lasting (e.g. disruption of slow-recovering vegetation communities) or even permanent (e.g. thermokarst). These impacts would, however, be highly localized and insignificant on a regional scale.

Economy

Oil Exploration, Development, and Production

Sale 193 would generate increases in North Slope Borough (NSB) property taxes that would average about 25% above the level of Borough revenues (without the sales) in the peak years and taper off to <15% in the latter years. In the early years of production, each sale would generate increases in revenues to the State of Alaska of <0.3%. The increases would taper off to an even smaller percent in the latter years of production. The change in total employment and personal income is <2% over the 2003 baseline for the NSB and <0.5% over the 2005 baseline for the rest of Alaska for each of the three major phases of OCS activity: exploration, development, and production. The employment and personal income increase includes workers to clean up a large oil spill of 1,500 bbl or 4,600 bbl. Sale193 would contribute to extending the lifespan of the Trans-Alaska Pipeline System (TAPS).

Natural Gas Development and Production

Natural gas development and production under the Proposed Action would result in a variety of beneficial economic impacts, namely employment, personal income, and revenues.

Subsistence-Harvest Patterns

Oil Exploration, Development, and Production

Effects on subsistence-harvest patterns could occur as a result of oil spills, seismic survey activity, and construction-related activities. Oil spills could cause multiyear suspensions or curtailments of subsistence activities for some marine mammal resources. Construction-related activities—pipeline placement, traffic noise, heavy-equipment movement, etc.—could hinder the harvest of subsistence resources. Because of the concentration of construction-related activities and the potential for this region to be affected by any oil-spill incident that could occur over the life of the field, the communities that use this area heavily for their subsistence resources would be those most affected by sale-related activities. Conversely, the communities that lie at some distance from the concentrated areas of construction would be those that experience less sale-related effects on subsistence-related activities.

For the communities of Barrow, Wainwright, Point Lay, and Point Hope, and Kivalina, noise and disturbances periodically could affect subsistence resources. Effects on bowhead whales, beluga whales, other marine mammals, terrestrial mammals, freshwater fish, marine fish, most birds, and polar bears are expected to range from negligible to local and short term (generally <1 year) and have no regional population effects. No resource or harvest area would become unavailable or undesirable for use, and no resource would experience overall population reductions. In the case of a large oil

spill, all areas directly oiled, areas to some extent surrounding them, areas used for staging, and transportation corridors for spill response would not be used by subsistence hunters for some time following a spill. The duration of avoidance by subsistence users would vary depending on the volume of the spill, the persistence of oil in the environment, the degree of impact on resources, the time necessary for recovery, and the confidence in assurances that resources were safe to eat. Oil-spill cleanup would increase these effects. Cleanup disturbances could displace subsistence species, alter or reduce subsistence-hunter access to these species, and alter or extend the normal subsistence hunt. Such oil-spill effects would be considered significant.

Natural Gas Development and Production

While natural gas development and production is not expected to appreciably reduce any populations of subsistence species, it is possible that disturbance caused by these activities could alter the local availability of these resources to harvesters. These impacts would be considered short-term and localized, and would not rise to the level of significant adverse effects.

Sociocultural Systems

Oil Exploration, Development, and Production

In characterizing the potential adverse effects from OCS activities, we look at the magnitude and duration of disruption, with “significant” effects equated to conditions described as a chronic disruption of social organization, cultural values, and institutional organization for a period two to five years with a tendency toward displacement of existing social patterns.

The effects of the 3D/2D seismic activities that are projected to occur are likely to be minimal. Effects to social well being (social systems) will be noticeable because of concern over deflection of the bowhead whale due to seismic survey activities and the attendant effects on subsistence harvest. Routine activities from exploration, development and production, and decommissioning, could cause noticeable disruption to social organization, cultural practices, and institutional organizations, especially during development, a period that will last more than 5 years. However, the combination of effects would not be sufficient to displace existing social patterns at the Regional level. On the local level, Wainwright may experience significant effects with noticeable disruption which will most likely result during development from the placement and onshore infrastructure (that is, the shore base in the scenario), with the most prominent effect the change in land use that comes about by introduction of industrialization. Wainwright could experience other effects to social organization, cultural values, and institutional organization for a period exceeding two to five years. Displacement of social patterns could occur as a result of social system adaptation to chronic disruptions.

For a large oil spill, noticeable disruption in excess of two years could occur from the oil spill and clean-up activities. The effects of this disruption would last beyond the period of clean up and would represent a chronic disruption of social organization, cultural values, and institutional organization. The effects would have a tendency to displace existing social patterns.

Activities associated with 3D/2D seismic surveys, exploration, development, production and decommissioning will cause some disruption to some elements of social organization, cultural practices, and institutional organization for a period of at least two years. This disruption is not expected to have a tendency to remarkably change (displace) existing social patterns at the regional (NSB) level. Effects could be significant but manageable on a local level (at Wainwright in the scenario because of supply base activity). Effects from a large oil spill could represent a chronic disruption of social organization, cultural values, and institutional organization and have a tendency to displace existing social patterns.

Natural Gas Development and Production

The following conclusions may be drawn from the analyses:

- At the regional level (NSB), effects from Sale 193 natural gas development and production should not exceed the significance threshold.
- At the local level (Wainwright in the scenario), effects from Sale 193 natural gas development and production should not exceed the significance threshold.
- Mitigation measures should prove effective in ameliorating many of the effects of Sale 193 natural gas development and production. Social systems are expected to successfully respond and adapt to the change brought about by the continuation of production activities. This accommodation response represents circumstances that should not exceed the significance threshold.

Archaeological Resources

Oil Exploration, Development, and Production

Archaeological surveys and analyses are required in areas where potential archaeological resources are at risk from offshore operations. These requirements are specified in the regulations (30 CFR 250.194; 30 CFR 250.203; 30 CFR 250.204; 30 CFR 250.1007(a)(5); and 30 CFR 250.1010(c)); and in law through the National Historic Preservation Act. Any archaeological resources, either onshore or offshore, are expected to be identified before any activities are permitted, and potential effects will be avoided or mitigated.

Natural Gas Development and Production

There is a small potential that certain natural gas development activities could cause irreversible adverse impacts to currently unknown archeological resources. Such impacts could be significant. However, the potential for significant adverse impacts will be further reduced through adherence with standard pipeline construction protocols and measures identified during the NHPA Section 106 consultation process.

Environmental Justice

Oil Exploration, Development, and Production

Alaskan Inupiat Natives are the predominant residents of the North Slope communities. As such, they could be disproportionately affected by disturbance impacts from seismic activity, vessel, aircraft, construction noise, and oil spills because of their reliance on subsistence foods. “Significant” effects on Environmental Justice are defined as: disproportionately high adverse impacts to low-income and minority populations. Potential significant impacts to subsistence resources and harvests and consequent impacts to sociocultural systems could result in adverse environmental justice impacts. With required mitigation and conflict avoidance measures in place, significant impacts to subsistence resources and hunts from seismic activity and noise and disturbance would not be expected to occur as a result of this action, thereby avoiding significant impacts on sociocultural systems and disproportionately high adverse impacts on low income and minority populations in the region. Disproportionately high and adverse impacts to this group could occur in the unlikely event of a large oil spill.

Natural Gas Development and Production

No major adverse impacts are expected for Alaska Inupiat Natives, the only significant “minority” group within the action area. However, one can expect several forms of minor impacts related to potential effects on subsistence resources and practices, human health, and perhaps sociocultural systems.

II.D.2. Summary of Impacts: Alternative II – No Lease Sale

Under this alternative, the opportunity for development of the estimated oil and gas resources that could have resulted from the Proposed Action would be precluded or postponed, and any potential environmental impacts resulting from any of the Proposed Action would not occur or would be postponed.

Summary of Impacts of Natural Gas Production: Under the No Action alternative (Alternative II), the Secretary would decline to reaffirm Sale 193, and would instead cancel the leases. No offshore development or production would occur under Sale 193, although such activities could occur within the Chukchi Sea under a future lease sale. Potential environmental impacts to the marine, coastal, and human environment from offshore development and production would not occur or would be delayed. Economic benefits to local communities, the North Slope Borough, the State of Alaska, and the Federal Government would not be realized at this time, due to delay and/or missed opportunities. The selection of this alternative would also postpone potential contributions to national energy supplies and security. A variety of adverse and beneficial impacts generally associated with petroleum production could be displaced to other localities, both domestic and foreign.

II.D.3. Summary of Impacts: Alternative III – Corridor I Deferral

Summary of Impacts of Natural Gas Production

The effects of natural gas production would be largely the same as described above in the summary of impacts for Alternative I (Proposed Action).

The major difference between Alternative III (Corridor I deferral) and Alternative I (the Proposed Action) is that the blocks within the deferral area would not be offered for lease under Alternative III. Exploration seismic surveying, ancillary activities along potential pipeline routes, and installation of a pipeline to shore could still occur within the deferral corridor. No exploration or development drilling or platform construction would occur within the deferred area. The minimum length of a pipeline from a platform to shore would be greater under Alternative III than under Alternative I. Travel distances for vessel and aircraft supporting exploration and development drilling activities and platform construction and operations would be greater under Alternative III than Alternative I. The minimum distance to shore that discharges, emissions, and noise associated with drilling and platform installation and operation could occur would be greater under Alternative III than under Alternative I.

The deferral area (Corridor I) under Alternative III is wider (i.e., defers more blocks) than the deferral area (Corridor II) under Alternative IV. The minimum length of a pipeline from a platform to shore would be greater under Alternative III than under Alternative IV. Travel distances for vessel and aircraft supporting exploration and development drilling activities and platform construction and operations would be greater under Alternative III than Alternative IV. The minimum distance to shore that discharges, emissions, and noise associated with drilling and platform installation and operation could occur would be greater under Alternative III than under Alternative IV.

Water Quality

The level of potential activities remains the same for Alternative I, III, or IV; therefore, the actions and sources of water quality degradation do not change. The deferral areas may avoid localized discharges to marine waters; however, the removal of the deferred lease blocks would not significantly change the effects on marine water quality either negatively or beneficially. Compliant postlease activities would not pose a significant degree of risk to water quality, regardless of the location of the discharges.

Air Quality

Potential air quality impacts from Alternative III to adjacent onshore areas would be lower under Alternative III than Alternative I because of the greater distance from shore of the nearest tract available for leasing. The difference, however, would be negligible.

Lower-Trophic-Level Organisms

The effects on lower trophic-level organisms would be due partly to possible discharges in nearshore areas and to oil spills that could contact the coastline next to the Spring Lead System. The deferral of 1,765 whole or partial blocks near the coast would decrease the level of potential effects. Therefore, total effects from Alternative III would be lower than total effects summarized for Alternative I (above), but the relative level of effects from each alternative would be similar.

Fish Resources

The primary benefit of this alternative is that it would move sources of potential adverse effects further away from important fish habitats. The increased distance between offshore development and coastal fish habitats also conceivably could decrease the chance of spilled oil contacting the coastline, increase weathering of spilled oil prior to contact, and increase available spill response time.

Essential Fish Habitat

In theory, this deferral alternative would provide more protection for coastal and marine fish habitat by moving drilling and construction noise disturbances and water quality impacts (exploration and production platform discharges, turbidity) further away from the Chukchi Sea coastline.

Additional potential resource benefits could occur if a large oil spill happened because the increased distance to the shoreline conceivably reduces the percent chance of one or more spills $\geq 1,000$ bbl contacting sensitive coastal resources and the increased time required for oil to travel this greater distance would conceivably allow for a more effective response from spill response depots. The absolute changes in conditional probabilities (the percent chance that a large spill would reach coastal habitats) associated with this alternative could be quantified, but this has not been done.

At the same time, deferrals could increase pipeline distances. Increased pipeline distances could increase the potential for a pipeline spill and could result in greater pipeline construction impacts. All of the potential effect categories remain the same as the proposed action, but the anticipated impacts would be lower due to the setback from the coast. Overall, the greatest net ecological benefits to EFH would accrue from this alternative because it contains the largest deferral area.

Threatened and Endangered Marine Mammals

This alternative would reduce potential conflicts between migrating bowhead whale populations, bowhead whale subsistence hunters, and offshore oil and gas operations. However, exploration seismic surveys would be allowed to continue in the corridor.

Differences in noise and oil-spill effects to bowhead whales from this deferral compared to Alternative I (Proposed Action) and Alternative IV (Corridor II Deferral) are difficult to quantify, but qualitatively can be described. While the selection of this alternative decreases the opportunity of discovering a commercial field, the resources in and adjacent to this area still could be adversely affected by a large oil spill originating from a production site and/or pipeline located elsewhere in the sale area.

This alternative would move sources of industrial noise and sources of crude oil further offshore and away from the spring lead system, thus reducing the likelihood of spring bowhead whale encounters with industrial noise. It would not, however, substantially reduce the chance of crude oil contacting the spring-migratory route because: (1) pipelines, constructed through the spring-migratory route in order to transport oil to shore-based processing facilities, could leak; and, (2) oil-spill-trajectory

models indicate that depending on the volume of oil spilled and oceanographic and weather conditions, oil spilled outside Corridor I could be transported into the spring-migratory route. However, because this alternative reduces the number of potential oil-spill launch sites and their locations are further away from the spring-migratory route, any spill that would occur would conceivably take longer to reach and enter the spring-migratory route, thus allowing more time to respond to the spill. Because fall migrating bowhead whales are not expected to use the deferred area, fall bowhead encounters with oil and gas-related industrial noise and oil spills would be the same as for Alternative I (Proposed Action).

Implementing existing mitigation measures and conservation recommendations in the NMFS Arctic Region Biological Opinion (dated June 16, 2006) would provide the necessary protection to prevent and/or minimize adverse environmental impacts on the bowhead whale from routine activities.

Other Marine Mammals

The primary benefit of this corridor is that it would move sources of potential adverse effects further away from important coastal habitats. The increased distance between offshore development and coastal habitats also would conceivably decrease the percent chance of spilled oil contact with marine mammals in the coastal area, increase weathering of spilled oil prior to contact with marine mammals in the coastal area, and increase available spill-response time.

Threatened and Endangered Birds

Despite a deferral, this alternative could present new sources of disturbance, collision hazards, and oil/toxic pollution that could result in the taking of threatened Steller's and spectacled eiders. These activities remain likely to adversely affect Steller's and spectacled eiders. Similarly, this alternative could present new sources of disturbance and oil/toxic pollution that could result in the taking of Kittlitz's murrelet, a candidate species.

This alternative could also present new activities that could result in the physical modification of seafloor habitats and decrease use of the LBCHU by molting spectacled eiders. Under this alternative, these activities are less likely to adversely modify the LBCHU compared to Alternative I.

Other Marine and Coastal Birds

This deferral area would be in the form of a corridor on the shoreward margin of the proposed lease-sale area. The primary benefit of this corridor is that it would move sources of potential adverse effects further away from important bird habitats. The increased distance between offshore development and coastal bird habitats also would conceivably decrease the percent chance of spilled oil contacting bird habitat, increase weathering of spilled oil prior to contact, and increase available spill-response time.

Terrestrial Mammals

The primary benefit of this corridor is that it would move sources of potential adverse effects further away from important coastal habitats. The increased distance between offshore development and coastal habitats would conceivably decrease the percent chance of spilled oil contacting coastal habitats, increase weathering of spilled oil prior to contact coastal habitats, and increase available spill-response time.

Vegetation and Wetlands

The effects of Alternative III would be the same as Alternative I (Proposed Action).

Economy

The effects of Alternative III would be the same as Alternative I (Proposed Action).

Subsistence-Harvest Patterns

This alternative would potentially reduce sources for chronic noise and disturbance impacts on subsistence resources, subsistence whaling, and other marine mammal hunting. Because potential launch points for oil spills would move seaward, time for spilled oil to weather and time to mount an oil-spill response would be increased. Consequently, the effects on subsistence-harvest patterns would be expected to be reduced.

Sociocultural Systems

The reduction of effects to the components of sociocultural systems would marginally reduce in comparison to Alternative I (Proposed Action), but would not substantially alter the overall effects to sociocultural systems.

Archaeological Resources

The effects of Alternative III would be the same as Alternative I (Proposed Action).

Environmental Justice

Sale-specific Environmental Justice effects would derive from potential noise, disturbance, and oil-spill effects on subsistence resources, subsistence-harvest patterns, and sociocultural systems. Noise, disturbance, and oil-spill effects under Alternative III are expected to be reduced from those described for Alternative I (Proposed Action). The only substantial source of potential Environmental Justice-related effects to coastal subsistence-oriented communities on the Alaskan Chukchi Sea coastline would occur in the event of a large oil spill, which could affect subsistence resources. Such effects would represent disproportionate high adverse effects to Alaskan Natives in Chukchi Sea coastal communities—and would be considered significant Environmental Justice impacts. Potential adverse effects are expected to be mitigated substantially, though not eliminated.

II.D.4. Summary of Impacts: Alternative IV – Corridor II Deferral

Summary of Impacts of Natural Gas Production

The effects of natural gas production would be largely the same as described above in the summary of impacts for Alternative I (Proposed Action).

The major difference between Alternative IV (Corridor II deferral) and Alternative I (the Proposed Action) is that the blocks within the deferral area would not be offered for lease under Alternative IV. Exploration seismic surveying, ancillary activities along potential pipeline routes, and installation of a pipeline to shore could still occur within the deferral corridor. No exploration or development drilling or platform construction would occur within the deferred area. The minimum length of a pipeline from a platform to shore would be greater under Alternative IV than under Alternative I. Travel distances for vessel and aircraft supporting exploration and development drilling activities and platform construction and operations would be greater under Alternative IV than Alternative I. The minimum distance to shore that discharges, emissions, and noise associated with drilling and platform installation and operation could occur would be greater under Alternative IV than under Alternative I.

The deferral area (Corridor II) under Alternative IV is narrower (i.e., defers more blocks) than the deferral area (Corridor I) under Alternative III. The minimum length of a pipeline from a platform to shore would be less under Alternative IV than under Alternative III. Travel distances for vessel and aircraft supporting exploration and development drilling activities and platform construction and operations would be less under Alternative IV than Alternative III. The minimum distance to shore that discharges, emissions, and noise associated with drilling and platform installation and operation could occur would be less under Alternative IV than under Alternative III.

Water Quality

As the scenario remains the same for Alternatives I, III, and IV, the actions and sources of water quality degradation do not change, but are only sited elsewhere. The deferral areas may avoid localized discharges to marine waters; however, the removal of the deferred lease blocks would not significantly affect the marine water quality either negatively or beneficially. Compliant postlease activities do not pose a significant degree of risk to water quality.

Air Quality

Alternative IV would lower potential air quality impacts to the adjacent onshore area more than Alternative I but not as much as under Alternative III. Tracts available for leasing are nearer the shore than under Alternative III, but not as close as under Alternative I. The difference in air quality impact, however, would be negligible.

Lower-Trophic-Level Organisms

The effects of Alternative IV would be the same as Alternative I (Proposed Action).

Fish Resources

The primary benefit of the deferred corridor in this alternative is that it would move sources of potential adverse effects further away from important fish habitats. The increased distance between offshore development and coastal fish habitats also would conceivably decrease the percent chance of spilled oil contacting fish resources, increase weathering of spilled oil prior to contacting fish resources, and increase available spill-response time. This alternative would provide the same types of net resource benefits as Alternative III, but at a reduced level.

Essential Fish Habitat

As explained under the analysis for Alternative III, a deferral would provide more protection for coastal and marine fish habitat by moving drilling and construction noise disturbances and water quality impacts (exploration and production platform discharges, turbidity) further away from the Chukchi Sea coastline. The primary benefit of the deferral of Corridor II under Alternative IV is that it would move sources of potential adverse effects further away from important fish habitats. The increased distance between offshore development and coastal fish habitats also would conceivably decrease the percent chance of spilled oil contacting nearshore fish habitats, increase weathering of spilled oil prior to contact, and increase available spill-response time.

Threatened and Endangered Marine Mammals

The assessment of this alternative is essentially identical to the assessment for Alternative III (Corridor I Deferral). This alternative also would preclude the development, production, and abandonment of oil and gas activities in the lease blocks within Corridor II, thereby reducing (but not as much as Alternative III) potential conflicts between migrating bowhead whale populations, bowhead whale subsistence hunters, and offshore oil and gas operations. Exploration seismic surveys would be allowed to continue within the corridor.

Differences in noise and oil-spill effects to bowhead whales from this deferral compared to Alternative I (Proposed Action) and Alternative III (Corridor I Deferral) are difficult to quantify, but qualitatively can be described. While the selection of this alternative decreases the opportunity of discovering a commercial field and the number of oil-spill launch sites, the resources in and adjacent to this area still could be adversely affected by a large oil spill originating from a production site and/or pipeline located elsewhere in the sale area. Therefore, the impacts of oil spills and industrial noise on threatened and endangered marine mammals, as described and for Alternative I (Proposed Action) apply.

The deletion of this area from the lease sale would move sources of industrial noise and sources of crude oil further offshore and away from the spring lead system, thus somewhat reducing the likelihood of spring bowhead whale encounters with industrial noise. It would not, however, substantially reduce the chance of crude oil contacting the spring-migratory route because: (1) pipelines constructed through the spring-migratory route to transport oil to shore-based processing facilities could leak; and (2) oil-spill-trajectory models indicate that depending on the volume of oil spilled and oceanographic and weather conditions, oil spilled outside Corridor II could be transported into the spring-migratory route. However, because this alternative reduces the number of potential oil-spill launch sites and their locations are farther away from the spring-migratory route, any spill that would occur would conceivably take longer to reach and enter the spring-migratory route, thus allowing more time to respond to the spill (but not as much response time afforded by Alternative III, Corridor I Deferral). Because fall-migrating bowhead whales are not expected to use the deferred area, fall bowhead encounters with oil and gas-related industrial noise and oil spills would be the same as for Alternative I (Proposed Action).

Existing BOEM mitigation measures and the conservation recommendations in the NMFS Arctic Region Biological Opinion (dated June 16, 2006), would provide the necessary protection to prevent and/or minimize adverse environmental impacts on the bowhead whale.

Other Marine Mammals

Alternative IV would provide a deferral area smaller than Alternative III and provide greater net resource benefits to marine mammals than Alternative I. This deferral area would be in the form of a corridor on the shoreward margin of the proposed sale area. The primary benefit of this corridor is that it would move sources of potential adverse effects further away from important coastal habitats. The increased distance between offshore development and coastal habitats also could slightly decrease the percent chance of spilled oil contacting marine mammals, increase weathering of spilled oil prior to contact coastal habitats, and increase available spill-response time.

Threatened and Endangered Birds

Despite a deferral, this alternative could present new (but potentially fewer than Alternative I) sources of disturbance, collision hazards, and oil/toxic pollution that could result in the taking of threatened Steller's and spectacled eiders. These activities remain likely to adversely affect Steller's and spectacled eiders. Similarly, this alternative could present new, but potentially fewer, sources of disturbance and oil/toxic pollution that could result in the taking of Kittlitz's murrelet, a candidate species.

This alternative could also present new activities that could result in the physical modification of seafloor habitats and decrease use of the LBCHU by molting spectacled eiders. Under this alternative, these activities are less likely to adversely modify the LBCHU compared to Alternative I.

Other Marine and Coastal Birds

This alternative has a smaller deferral area than Alternative III. The primary benefit of this deferral is that it would move sources of potential adverse effects farther away from important bird habitats. The increased distance between offshore development and coastal bird habitats also would conceivably decrease the percent chance of spilled oil contacting bird habitats, increase weathering of spilled oil prior to contact, and increase available spill-response time. This alternative would provide the same types of net resource benefits as Alternative III, but at a reduced level.

Terrestrial Mammals

This alternative would provide a deferral area smaller than Alternative III and would be in the form of a corridor on the shoreward margin of the proposed sale area. The primary benefit of this corridor is that it would move sources of potential adverse effects further away from important coastal habitats.

The increased distance between offshore development and coastal habitats would slightly decrease the percent chance of spilled oil occurring and contacting terrestrial mammals and associated habitat, increase weathering of spilled oil prior to contacting terrestrial mammals and associated habitat, and increase available spill-response time.

Vegetation and Wetlands

The effects of Alternative IV would be the same as Alternative I (Proposed Action).

Economy

The effects of Alternative IV would be the same as Alternative I (Proposed Action).

Subsistence-Harvest Patterns

This alternative would potentially reduce sources for chronic noise and disturbance impacts on subsistence resources, subsistence whaling, and other marine mammal hunting. Because potential launch points for oil spills would move seaward, time for spilled oil to weather and time to mount an oil-spill response would be increased. Consequently, the effects on subsistence-harvest patterns would be expected to be reduced. Reductions in noise, disturbance, and oil-spill effects from this deferral would provide the same types of resource benefits as described in Alternative III but at a reduced level, because the area deferred is smaller.

Sociocultural Systems

The reduction of effects to the components of sociocultural systems would marginally reduce in comparison to Alternative I (Proposed Action), but would not substantially alter the overall effects to sociocultural systems.

Archaeological Resources

The effects of Alternative IV would be the same as Alternative I (Proposed Action).

Environmental Justice

Sale-specific Environmental Justice effects would derive from potential noise, disturbance, and oil-spill effects on subsistence resources, subsistence-harvest patterns, and sociocultural systems. Noise, disturbance, and oil-spill effects under Alternative IV (Corridor II Deferral) are expected to be reduced from those described for Alternative I (Proposed Action). Effects reductions from this deferral would provide the same types of resource benefits as described in Alternative III but at a reduced level, because the area deferred is smaller. The only substantial source of potential Environmental Justice-related effects to coastal subsistence oriented communities on the Alaskan coastline would occur in the event of a large oil spill, which could affect subsistence resources. Such effects would represent disproportionate high adverse effects to Alaskan Natives in Chukchi Sea coastal communities and would be considered significant Environmental Justice impacts. Potential adverse effects are expected to be mitigated substantially, though not eliminated.

Chapter III. Description of the Environment

The following sections summarize the description of the physical, biological, and socioeconomic conditions and resources from the 193 FEIS. Numbered headings have been maintained as designated in the 193 FEIS for ease of reference. New information—available subsequent to publication of the 193 FEIS—with relevance to an analysis of potential effects from natural gas development and production is also included. For a more detailed discussion of the environmental conditions and resources in the Sale 193 area project area, readers are directed to the 193 FEIS (incorporated by reference).

III.A. Physical Environment

III.A.1. Physiography

The Chukchi Sea is located in the Arctic Ocean northwest of the Alaska Arctic coast (Figure 1). The Chukchi Sea Planning Area overlies a broad, low-relief continental shelf that is gently inclined to the north. Approximately 98% of the Sale 193 area covers the relatively shallow continental shelf adjacent to the Arctic Ocean. Approximately 80% of the continental shelf lies between the 95 and 200 ft (30 and 60 m) isobaths (Grantz et al., 1982). Near-shore areas (shallower than 40 m) exhibit complex bathymetry characterized by ridges and troughs. Hanna Shoal within the Sale 193 area and Herald Shoal to the west side rise above the surrounding seafloor to approximately 20 m below sea level. There are also two major sea valleys in the Chukchi Sea: Herald Canyon and Barrow Canyon.

The shoreline west of Barrow is characterized by nearly continuous sea cliffs up to 12 m high cut into perennially frozen ice-rich sediments. Near Icy Cape and Point Franklin offshore barrier islands front the coast, enclosing shallow lagoons. Elsewhere the cliffs are abutted by narrow beaches. The Arctic Coastal Plain (ACP) is flat near the coast, and gradually increases in relief to the south towards the foothills of the Brooks Range.

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to physiography, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.A.2. Climate and Meteorology

The Chukchi Sea is a sub-Arctic (high-latitude) marine region characterized by moderate winds, cold temperatures during the winter, cool temperatures in the summer, and little annual precipitation. The region is dominated by subfreezing temperatures for most of the year, and the Chukchi Sea is almost totally ice covered from early December to mid-May. During the winter, winds can be severe and prolonged, leading to extreme ice pressures and dangerous wind-chill conditions. A brief warm and snow-free season follows in June, July, and August.

New information for SEIS analysis of natural gas development and production

The Arctic has seen very large cyclical variations over the past 2 million years. The changes have not been uniform over the area. Large changes also have taken place abruptly, spanning just a few decades. The driving factors are complex but involve changes in solar radiation, atmospheric circulations, ocean circulations, and the cryosphere. The Draft EIS for the Beaufort Sea and Chukchi Sea Planning Areas Oil and Gas Lease Sales 209, 212, 217, and 221 (USDOL, MMS, 2008) provides a summary discussion of climate variability in the Arctic prior to the 20th century.

The Arctic climate is undergoing changes as a result of global climate change as well as natural cyclical variations. The Arctic Climate Impact Assessment (ACIA, 2005) summarized spatial and temporal temperature trends in the Arctic based on observations from the Global Historical

Climatology Network database (Peterson and Vose, 1997) and the Climate Research Unit database (Jones and Moberg, 2003). The greater amount of warming in the Arctic compared to that for the globe as a whole is consistent with climate model projections (IPCC, 2007b). In general, temperatures increased from 1900 to the mid-1940s, decreased until about the mid-1960s, and then increased again up to the present. From 1966-2003, the average rate of temperature change for the Arctic was 0.40 °C (0.7 °F) per decade (ACIA, 2005). When temperature trends are broken down by season, the largest changes occurred in winter and spring.

An analysis by Rigor, Colony, and Martin (2000) for the entire Arctic Ocean for the period 1979-1997, indicates an increase in surface air temperature of about 1.0 °C (1.8 °F) per decade in the eastern Arctic, whereas the western Arctic shows no trend or even a slight cooling in the Canadian Beaufort Sea. During fall, the trends show a cooling of about 1.0 °C (1.8 °F) per decade over the Beaufort Sea and Alaska (Rigor, Colony, and Martin, 2000). During spring, a significant warming trend of 2 °C (3.6 °F) per decade can be seen over most of the Arctic. Summer shows no significant trend.

A trend analysis for first-order observing stations in Alaska for the period of 1949-2007 shows an average temperature change of 1.9 °C (3.4 °F). The largest increase was seen in winter and spring, with the smallest change in autumn. The trend has been far from linear. There was a decrease in temperature in the period from 1949-1976 followed by an abrupt increase in temperature in the period from 1973-1979. Since 1979, only a little additional warming has occurred in Alaska with the exception of Barrow and a few other locations.

Precipitation in the Arctic exhibits an upward trend, consistent with what is observed in mid-latitudes. Mean annual precipitation in the Arctic has increased at the rate of 1.4% per decade in the period from 1900-2003 and at a rate of 2.2% per decade in the period from 1966-2003 (ACIA, 2005). A few studies also indicate that an increasingly larger portion of precipitation falls in the form of rain (ACIA, 2005). Precipitation in Alaska also follows an upward trend.

Climate change in the Arctic is projected to be larger than in other areas of the globe (ACIA, 2005). However, arctic climate has a larger natural variability and is highly complex and, therefore, climate projections may have greater uncertainty. Of all the parameters, sea level rise has the largest uncertainty.

III.A.3. Physical Oceanography

The physical oceanography in the Chukchi Sea Planning Area is influenced by: (1) the flow of water through the Bering Strait and the Siberian Coastal Current; (2) the atmospheric-pressure systems; (3) surface-water runoff; (4) density differences between watermasses; and (5) seasonal and perennial sea ice.

Flow in the Chukchi Sea generally is northward from the Bering Strait and in general is topographically steered. The mean transport can be interrupted by wind-forced currents, and the variations can be large (Weingartner et al., 1998; Woodgate, Aagaard, and Weingartner, 2005).

The general cycle of the watermasses is cooling in the fall, increasing salinity in winter, and warming and freshening starting in spring and continuing into summer. Large changes in temperature and salinity occur throughout the year, with the largest variability along the Alaskan Chukchi coast.

Tides are small in the Chukchi Sea, generally <0.3 m. Tidal currents are largest on the western side of the Chukchi and near Wrangel Island, ranging up to 5 cm/s (Woodgate, Aagaard, and Weingartner, 2005).

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to physical oceanography, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.A.4. Sea Ice

There are three general forms of sea ice in the Sale 193 area: (1) landfast ice, which is attached to the shore, is relatively immobile and extends to variable distances offshore; (2) stamukhi ice, which is grounded and ridged ice; and (3) pack ice, which includes first-year and multiyear ice, and moves under the influence of winds and currents. These general ice types vary spatially and temporally in the Chukchi Sea Planning Area and are strongly influenced by the bathymetry and location of offshore shoals as well as the atmospheric-pressure fields.

In the Sale 193 area, sea-ice extent has a large seasonal cycle, generally reaching a maximum extent in March and a minimum in September. There is a large amount of interannual variability in the formation and breakup patterns of sea ice.

Sea ice generally begins forming in late September or early October, covering most of the sale area by mid-November or the beginning of December (Brower et al., 1988; Belchansky, Douglas, and Platonov, 2004). The summer melt pattern primarily is influenced by the influx of warmer water from the Bering Sea. Melt-onset begins in early May in the southern portion of the Sale 193 area and early to mid June in the northern portion. By about mid-May, the nearshore ice and thin ice begin to melt; by July, the pack ice begins retreating northward. At the height of summer (mid-September in the Arctic), the Chukchi is normally 80% free of ice (Mulherin, Sodhi, and Smallidge, 1994). Freeze onset begins in mid- to late October in the southern portion and late September to late October in the northern portion (Belchansky, Douglas, and Platonov, 2004).

The arctic sea ice is undergoing changes in extent, thickness, distribution, age, and melt duration (Stroeve et al., 2005; NASA, 2005; Comiso, 2006a). The analysis of long-term data sets indicates substantial reductions in both the extent (area of ocean covered by ice) and thickness of the arctic sea-ice cover during the past 20–40 years.

Landfast Zone

The mean annual cycle of landfast ice begins in October and grows slowly through February. First ice appears anywhere from late October to late December. Stable landfast ice appears from mid-January to mid-March. In the shallow (2 m and less), inner part of the landfast zone, the ice freezes to the seafloor; in the outer part, the ice floats. Thawing begins about late May, and breakup occurs from about late May to mid-June. Overall there is a gradual formation of landfast ice and a rapid retreat.

Stamukhi Zone

The ice zone that lies seaward of the landfast ice has been referred to as the stamukhi (shear or flaw) zone. This zone is a region of dynamic interaction between the relatively stable ice of the landfast zone and the mobile ice of the pack-ice zone that results in the formation of ridges, leads, and polynyas (large areas of open water).

Pack-Ice Zone

The pack-ice zone lies seaward of the stamukhi zone and includes: (1) first-year ice; (2) multiyear floes, ridges, and floebergs; and (3) ice islands.

During the winter, the pack ice in the northern part of the Chukchi Sea Planning Area generally moves in a westerly direction. Pack ice in the southern part of the Planning Area is usually transported to the north or northwest.

Sea ice thicker than 5 m is common in the Arctic Ocean pack ice.

Chukchi Sea Open-Water System

A large polynya, or a series of polynyas, develop between the landfast- and pack-ice zones extending the length of the Chukchi coast from Point Hope to Barrow during the winter and spring (Stringer and Groves, 1991). Polynyas preferentially occur along coasts with offshore winds, as is frequently the case in the eastern Chukchi Sea between Point Hope and Barrow during winter. During May and June, the average width of the open-water system is about 4 km at the northern end (toward Barrow) but widens to about 100 km at the southern end (toward Point Hope). September is the period of maximum open water. The freezeback process begins in October. General locations for polynyas in this region are illustrated in the 193 FEIS (Figure III.A-14).

Ice Gouging

At depths shallower than 60 m, linear depressions have been gouged into the seafloor by the keels of drifting ice masses. Between Point Barrow and Icy Cape, the maximum observed gouge-incision depth generally increases slightly from 2.4 m at 12 m of water depth to 2.8 m at 24 m of water depth. Below 28–30 m, the gouge-incision depth decreases with increasing depth, possibly a reflection of the thin sediment cover. Contemporary ice gouging may be occurring in water at least 43 m deep. In the central part of the Sale 193 area, ice gouges were observed cutting across sand-ripple fields that may be active under present-day current regimes.

The BOEM has collated available ice-gouge and strudel-scour data from site-specific exploration and development surveys in the Beaufort Sea and is just beginning this effort in the Chukchi Sea. Required site-specific surveys in support of any proposed drilling or production activities in the Chukchi Sea will provide information on ice gouging in the local area before decisions are made on specific proposed activities and will be added to the collated data base.

New information for SEIS analysis of natural gas development and production

Satellite data have shown that arctic sea-ice extent has decreased by about 2.7% per decade during the period 1978 through 2005 (IPCC, 2007). This decreasing trend is observed in all seasons, but the greatest decrease is found in September with a trend of -8.6% per decade (Serreze, Holland, and Stroeve, 2007). In September 2007, arctic sea-ice extent reached its lowest value since satellite measurements began in 1979, and was 23% lower than the previous record established in 2005 (National Snow and Ice Data Center [NSIDC], 2007). The causes of the decline in sea ice are thought to be attributed to many variables, including a rise in air temperatures, changes in radiative fluxes from increases in greenhouse gases, and changes in wind circulation and ocean currents (Serreze, Holland, and Stroeve, 2007).

III.A.5. Water Quality

Water quality describes the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose. Important water column properties include temperature, salinity, and density.

The water quality of the Alaska Arctic region OCS is relatively pristine due to the remoteness, harsh but active ecological system, and limited anthropogenic inputs. Industrial impacts are minimal and degradation of the Arctic OCS water quality is confined almost exclusively to external intrusions and naturally occurring processes. Marine water quality conforms to the U.S. Environmental Protection Agency (USEPA) criteria for the protection of marine life. Water quality in the nearshore Arctic

Ocean (landward of the 40-m water-depth line) may be slightly affected locally by both anthropogenic and natural sources. Most detectable pollutants occur at very low levels in arctic waters and/or sediments and do not pose an ecological risk to marine organisms (USDOJ, MMS, 2003b).

Local water quality is largely related to seasonal biological activity and naturally occurring processes, such as water-column stratification due to temperature differentials, seasonal plankton blooms (primarily in spring and fall), naturally occurring oil/hydrocarbon seeps, seasonal changes in water turbidity due to terrestrial runoff, formation of surface water ice, and natural erosion of organic material along the shorelines. The main rivers that flow into the Arctic marine environment remain relatively unpolluted by human activities.

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to water quality, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.A.6. Air Quality

The USEPA uses six “criteria pollutants” as indicators of air quality and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards (NAAQS).

The air quality of the Chukchi Sea area is well within the NAAQS and State of Alaska ambient air quality standards (18 AAC 50). The area is relatively pristine; there are few nearby industrial emission sources and no substantial population centers. Because concentrations of criteria pollutants are far less than federal and state standards, the Chukchi area is classified as an attainment area under the Clean Air Act.

This winter phenomenon of arctic haze is attributed primarily to long-range transport of pollutants from sources on the Eurasian continent (ADEC, 2002; Rahn, 1982).

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to air quality, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.A.7. Acoustic Environment

Ambient sound levels in the Chukchi Sea can vary dramatically between and within seasons as a result of the following: (1) variability in components of environmental conditions such as sea ice, temperature, wind, and snow; (2) the presence of marine life; (3) the presence of industrial shipping, research activities, and subsistence activities; and (4) other miscellaneous factors. In general, ambient sound in the Arctic marine environment varies widely and seasonally. Ambient sound levels can affect whether a specific sound is detectable by a receiver, including a living receiver. Burgess and Greene (1999) measured ambient sound in the Beaufort Sea in September from about 63 to 133 dB re 1 μ Pa.

In the Chukchi Seas, natural sources of marine sound include the wind stirring the surface of the ocean, lightning strikes, animal vocalizations and noises (including whale calls, echolocation clicks, and snapping shrimp), subsea earthquakes, and ice movements. At least seasonally, animals can also contribute significantly to the background sound in the acoustic environment of the Chukchi Sea.

Human sources sound in the marine environment include vessels (motor boats used for subsistence and local transportation, commercial shipping, research vessels, etc.); navigation and scientific

research equipment; airplanes and helicopters; human settlements; military activities; and marine development.

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to the acoustic environment, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.B. Biological Environment

III.B.1. Lower-trophic-level Organisms

The Chukchi Sea is generally thought of as having the highest benthic faunal mass of all the arctic shelves (Grebmeier and Dunton, 2002; Dunton et al., 2005). This biomass is relatively high in the northeastern Chukchi Sea when compared to the central and western Chukchi Sea (Grebmeier and Dunton, 2000). Grebmeier and Dunton (2000) explain this richness is due in part to nutrient availability from large amounts of organic matter sinking to the seafloor in these areas. A review paper by Grebmeier, et al (2006), synthesizing some 20 years of data from interdisciplinary oceanographic cruises, found there are areas of high benthic biomass and abundance in the south central and northeastern Chukchi Sea.

Primary productivity in the Chukchi Sea is higher near the Bering Strait, along the Russian Chukotka coast, around Point Hope and Cape Lisburne, and along the Alaskan coast, including Ledyard Bay. Primary productivity probably is high within the Sale 193 area during the early summer retreat of the ice edge. During midsummer, primary productivity generally is low and relatively uniform within the Sale 193 area.

Kelp communities in the Chukchi Sea are located only inshore of the Sale 193 area, but within the area through which the offshore natural gas pipeline might be constructed. A well-known kelp community is in the center of Peard Bay (Dunton, Reimnitz, and Schonberg, 1982). There is kelp also along the coast near Skull Cliffs, about 20 km to the northeast of Peard Bay, and along the coast about 25 km southwest of Wainwright in water depths of 11–13 m (Mohr, Wilimorsky, and Dawson, 1957). The spatial extent of these kelp beds is probably limited by the presence of rock and other hard substrate.

Squid occur in the northeastern Chukchi Sea. In general, squid can be among the more dominant prey species for some marine fishes, seabirds, and marine mammals. The snow crab (*Chionoecetes opilio*) is a dominant benthic species in the northeastern Chukchi Sea (Paul, Paul, and Barber, 1997, citing Slizkin 1989).

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to lower-trophic-level organisms, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.B.2. Fish Resources

The Alaskan Chukchi and western Beaufort seas support at least 98 fish species representing 23 families (Mecklenburg, Mecklenburg, and Thorsteinson, 2002). The primary assemblages of Arctic fishes are defined as (1) freshwater fishes, (2) marine fishes, and (3) diadromous fishes. These assemblages can be further defined at a secondary assemblage level: (a) the neritic-demersal assemblage, (b) the neritic-pelagic assemblage, (c) the cryopelagic fish assemblage, (d) the oceanic-pelagic assemblage, (e) the oceanic-demersal assemblage, and (f) the diadromous assemblage.

Neritic-demersal Assemblage

The neritic-demersal assemblage is comprised of marine fishes living at or near the seafloor of the continental shelf and capable of active swimming. Species of this assemblage that are attributed as being widespread or abundant include the fourhorn sculpin, twohorn sculpin, polar eelpout, and arctic flounder.

Neritic-pelagic Assemblage

The neritic-pelagic assemblage is comprised of fishes inhabiting the water column over the continental shelf. Species of this assemblage regarded as widespread or abundant include the Pacific herring, arctic cod, capelin, and Pacific sand lance.

Cryopelagic Assemblage

The cryopelagic fish assemblage describes fishes actively swimming in neritic or oceanic waters but, during their life cycle, are associated with drifting or fast ice. The arctic cod is abundant in the region and their enormous autumn-winter pre-spawning swarms are well known. The species is also widely distributed and they make distant migrations, not only along the shelf areas in the Arctic Basin but also in higher latitudes. In addition to the arctic cod, other cryopelagic fishes of the Alaskan arctic region include polar cod, toothed cod, and Pacific sand lance.

Oceanic-pelagic Assemblage

The oceanic-pelagic assemblage of fishes inhabits the water column of oceanic waters seaward of the 200-m isobath; most species exhibit some preference for bathymetric stratification. Those species chiefly occurring within the upper 200 m of the water column are regarded as epipelagic fishes. Several of the epipelagic species include the Pacific herring, arctic cod, polar cod, and Pacific sand lance.

Oceanic-demersal Assemblage

The oceanic-demersal assemblage includes fishes living on or close to ocean-bottom substrates. The ogac, ribbed sculpin, spatulate sculpin, shorthorn sculpin, spinyhook sculpin, archer eelpout, pale eelpout, and daubed shanny are included in this assemblage.

Diadromous Assemblage

The diadromous assemblage fishes move between fresh, brackish, and/or marine waters. The term diadromous incorporates all migration types between marine and fresh waters, including single lifetime events, repetitive multiyear events, spawning migrations, feeding migrations, and seasonal movements between environments.

Nearshore waters are the prime feeding area for North Slope diadromous fishes (Gallaway and Fechhelm, 2000). Diadromous and marine fishes are believed to compete for the same prey resources in nearshore waters (Craig, 1984; Fechhelm, Buck, and Link, 2006).0

Of the five species of Pacific salmon (anadromous fishes) present in Alaska, three are present with some regularity within the action area: pink, chum, and chinook. The occurrence of pink and chum salmon in arctic waters probably is due to their relative tolerance of cold water temperatures and their predominantly marine life cycle (Craig and Halderson, 1986, citing Salenius, 1973). Pink salmon are the most abundant salmon species in the Chukchi Sea. There are indications of small runs of chinook salmon in the Kugrua River, through Elson Lagoon (Fechhelm and Griffiths, 2001, citing George, pers. commun.), and strays have been captured in the Kuk River, near Wainwright (Craig and Halderson, 1986).

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to fish resources, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.B.3. Essential Fish Habitat

Salmon EFH

Freshwater Essential Fish Habitat (EFH) for salmon includes all streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon. Marine EFH for the salmon includes all estuarine and marine areas used by Pacific salmon of Alaska origin, extending from the influence of tidewater and tidally submerged habitats to the limits of the U.S. Exclusive Economic Zone (EEZ). In the deeper waters of the continental slope and ocean basin, salmon occupy the upper water column.

New information for SEIS analysis of natural gas development and production

The Northern Pacific Fishery Management Council (NPFMC) Arctic Fishery Management Plan (AFMP) (2009) identifies three commercial target species in the U.S. Arctic: arctic cod, saffron cod, and snow crab (opilio crab). The EFH for the three commercial target species are described as follows (NPFMC, AFMP, 2009):

Arctic Cod EFH, Adult and Late Juvenile.

The general distribution areas for this life stage are located in pelagic and epipelagic waters from the nearshore to offshore areas along the entire shelf (0–200 m) and upper slope (200–500 m) throughout arctic waters, and often associated with ice floes which may occur in deeper waters. The NPFMC has not determined EFH for eggs, larvae, and early juveniles (NPFMC, AFMP, 2009).

Saffron Cod EFH, Adult and Late Juvenile.

The general distribution area for this life stage is located in pelagic and epipelagic waters along the coastline, within nearshore bays, under ice along the inner (0–50 m) shelf throughout arctic waters, and wherever there are substrates consisting of sand and gravel. The NPFMC has not determined EFH for eggs, larvae, and early juveniles (NPFMC, AFMP, 2009).

Opilio crab EFH, Adult and Late Juvenile.

The general distribution area for this life stage is located in bottom habitats along the inner (0–50 m) and middle (50–100 m) shelf in arctic waters south of Cape Lisburne, wherever there are substrates consisting mainly of mud. Essential fish habitat of snow crab eggs is inferred from the general distribution of egg-bearing female crabs. The NPFMC has not determined EFH for larvae and early juveniles (NPFMC, AFMP, 2009).

Ecosystem Component Species

The AFMP describes and maps eight ecosystem component species that “are thought to be, should conditions allow, commercially viable.” These ecosystem component species are yellowfin sole, Alaska plaice, flathead sole, Bering flounder, starry flounder, capelin, rainbow smelt, and blue king crab. Habitat descriptions for these ecosystem component species can be found in the AFMP (NPFMC, AFMP, 2009).

The Magnuson-Stevens Fishery Conservation and Management Act (as amended) provides for an ecosystem-based approach to the management and protection of fish and fish habitat. Ecosystem component species are a category of non-target species that a Fishery Management Council may consider designating in a Fishery Management Plan. The intent of designating ecosystem component species is to understand the habitat of ecosystem component species, promote ecosystem-based

management and provide sound conservation and sustainability of fish and fisheries. The policy of designating ecosystem component species recognizes the “complex interactions among ecosystem components, and seeks to protect important species utilized by other ecosystem component species, potential target species, other organisms such as marine mammals and birds, and local residents and communities” (NPFMC, AFMP, 2009).

III.B.4. Threatened and Endangered Species

Marine Mammals (Threatened and Endangered)

Cetaceans

Three species of cetaceans listed as endangered under the ESA occur within or near the Chukchi Sea Planning Area. These species are the bowhead whale, fin whale, and humpback whale. The bowhead whale is the most common ESA-listed whale in the Chukchi Sea. No critical habitat for any of these species has been designated within the Chukchi Sea.

The Western Arctic stock of bowheads is the most robust of the bowhead populations; this stock of bowheads is increasing, resilient to current levels of mortality and other adverse effects, and may have reached the lower limit of the estimate of the population size that existed prior to intensive commercial whaling (e.g., Sheldon et al., 2001; IWC, 2004a,b; IWC, 2005a,b; NMFS, 2003a,b). The abundance of the Western Arctic stock in 2001 was estimated by George et al. (2004) to be 10,470 and by Zeh and Punt (2004, as cited in Angliss and Outlaw, 2005) as 10,545. Bowheads are extremely long-lived (100+ years), slow growing, slow to mature, and currently have high survival rates. These characteristics affect their vulnerability to pollution and disturbance in their environment.

Bowhead whales are unique in their ecology and their obligate use of lead systems to transit to summering grounds in the Canadian Beaufort Sea and calve during the spring northward migration from the Bering Sea. The Chukchi Sea Planning Area is an integral part of the total range of BCB seas bowhead whales, and portions of this planning area are primary calving grounds during the spring for these whales. During mid-March to approximately mid-June, bowheads migrate through leads on their way to their primary summer feeding grounds in the Canadian Beaufort Sea. In many years, large numbers of bowheads have been observed feeding in the western Chukchi Sea.

Polar Bear

There are two polar bear stocks recognized in Alaska: the southern Beaufort Sea stock (SBS) and the Chukchi/Bering Seas stock (CBS). The SBS population ranges from the Baillie Islands, Canada west to Point Hope. The CBS stock ranges from Point Barrow west to the Eastern Siberian Sea. These two populations overlap in the western Beaufort Sea and in the eastern Chukchi Sea from Point Hope to Point Barrow, centered near Point Lay (Amstrup, 1995; Amstrup et al., 2005).

The polar bear's preferred habitat is the annual ice over the continental shelf and inter-island archipelagos that encircle the polar basin (Derocher, Lunn, and Stirling, 2004). The coast, barrier islands, and shorefast ice edge provide an important corridor for polar bears traveling and feeding during fall, winter, and spring months. Late winter and spring leads that form offshore from the Chukchi Sea coast provide important feeding habitat for polar bears. Polar bears usually forage in areas where there are high concentrations of ringed seals, as these are their primary prey (Stirling and McEwan, 1975; Larsen, 1985), although bearded seals, walruses, and beluga whales also are taken (Amstrup and DeMaster, 1988). Polar bears will feed opportunistically on a variety of foods including carrion, bird eggs, and vegetation (Smith, 1985; Smith and Hill, 1996; Derocher, Wiig, and Bangjord, 2000).

In northern Alaska, pregnant females enter maternity dens by late November and emerge as late as early April. Maternal dens typically are located in snow drifts in coastal areas, stable parts of the

offshore pack ice, or on landfast ice (Amstrup and Garner, 1994). Most dens of the CBS stock are thought to occur on Wrangel Island. Along the U.S. Chukchi Sea coast, polar bear denning occurs at Cape Lisburne; Cape Beaufort; the barrier islands between Point Lay and Peard Bay; the Kukpowruk, Kuk, and Sinaruruk rivers; Nokotlek Point; Point Belcher; Skull Cliff; and Wainwright Inlet.

Polar bears are excellent swimmers and swim while actively hunting, while moving between hunting areas, and while moving between sea ice and terrestrial habitats. Swimming is believed to be more energetically costly than walking, which helps explain why bears will often abandon the melting sea ice in favor of land when ice concentrations drop below 50% (Derocher, Lunn, and Stirling, 2004). Polar bear use of coastal areas during the fall open-water period has increased in recent years and is projected to continue to increase (Kochnev et al., 2003; Schliebe et al., 2005).

Marine and Coastal Birds (Threatened and Endangered)

Threatened and endangered species in the Chukchi Sea Planning Area include the spectacled eider (threatened), Steller's eider (threatened), and Kittlitz's murrelet (candidate species). These species are known to seasonally occur in the Chukchi Sea OCS. The Kittlitz's murrelet is a candidate species for listing under the ESA.

Full descriptions of each species are provided in the 2006 BE (USDOI, MMS, 2006), which is incorporated by reference. Summary descriptions are provided below. Full descriptions of each species are also provided in the 2009 BE (USDOI, MMS, 2009) and BO (USDOI, FWS, 2009). The documents are on the BOEM website

http://alaska.boemre.gov/ref/Biological_opinions_evaluations.htm.

Spectacled Eider

Spectacled eider was listed as a threatened species under the ESA in May 1993 (58 *FR* 27474). The breeding population on the North Slope currently is the largest breeding population of spectacled eiders in North America. The North Slope population in the fall (October) is estimated to be 33,587 birds (Stehn et al., 2006). Spectacled eider density varies across the Alaskan Arctic Coastal Plain (ACP) (Larned, Stehn, and Platte, 2006).

Spectacled eiders make use of the spring lead system when they migrate from the wintering area. The spring lead system includes the Ledyard Bay Critical Habitat Unit (**Error! Reference source not found.**) and typically has represented the only open-water area along their path.

Spectacled eiders on the North Slope breed across the ACP, east to approximately the Canadian border. Once tundra nesting habitats are sufficiently melted to allow nesting (historically around June 10), most breeding pairs of spectacled eiders leave nearshore coastal areas to begin nesting on the ACP. As many as a few thousand pairs might nest on the North Slope. Spectacled eider nesting density on the ACP is variable, ranging from 0 to 0.95 nests per square kilometer (Larned, Stehn, and Platte, 2006).

Male spectacled eiders leave the nesting area at the onset of incubation and seek open waters of the Chukchi and Beaufort Seas until they move to molting areas in the Chukchi Sea or Russia. Many postbreeding male spectacled eiders slowly begin to converge in offshore aggregations in Ledyard Bay starting in July and begin an extended molt. While molting they are flightless for several weeks. Males that breed on the ACP (but return to molting areas in Russia) still make limited use of Ledyard Bay and other coastal areas of the Beaufort or Chukchi seas on their westward migration.

Female spectacled eiders begin to move to coastal areas at the end of their nesting effort. Females whose nests fail early on go to the coast and may linger in nearshore areas. Female spectacled eiders also use Ledyard Bay for flightless molt and are flightless for a period of a few weeks. Spectacled eider females with broods are the last to arrive at Ledyard Bay around the end of the first week of September.

The Ledyard Bay area was designated critical habitat for the spectacled eider in 2001 (66 *FR* 9145) (Figure 1). The critical habitat area includes the waters of Ledyard Bay within about 74 km (40 nmi) from shore, excluding waters <1.85 km (~1 nmi) from shore. Ledyard Bay Critical Habitat Unit (LBCHU) is an important molting area for North Slope-breeding spectacled eiders in the summer (males) and fall (breeding females). The molt is an energetically demanding period, and eiders are believed to use LBCHU for molting because of a combination of environmental conditions, abundance and accessibility of prey organisms, and level of disturbance and predation. Using satellite telemetry, Petersen, Larned, and Douglas (1999) determined that most spectacled eiders molting at LBCHU were between 30 and 40 km (10–21 nmi) offshore. Overall, many spectacled eiders remain in LBCHU until forced out by sea ice (typically late October through mid-November). Following the molt, spectacled eiders move to their wintering area south of St. Lawrence Island in the Bering Sea.

Steller's Eider

The Alaska breeding population of Steller's eiders is listed as a threatened species under the ESA. It is the least-abundant eider in Alaska, with a discontinuous historic breeding range along the coast from the Alaska Peninsula northward to the Beaufort Sea (Cooke, 1906; Rothe and Arthur, 1994; USDOI, FWS, 1996b).

Although Steller's eiders may occur at greater densities outside Kasegaluk Lagoon, the total numbers probably are low given the small numbers that breed on the North Slope. Less than 5% of the breeding population nests in arctic Alaska (Rothe and Arthur, 1994). Over 95% of the Alaskan breeding Steller's eiders occur on the ACP near Barrow (USDOI, FWS 1999, 2002b; Quakenbush et al. 2004). The FWS believes the ACP nesting population numbers to be in the hundreds or low thousands. Steller's eiders are paired within flocks when they arrive on the ACP, typically from early to mid-June (Quakenbush et al. 2004). They often nest on coastal wetland tundra, but some nest near shallow ponds or lakes well inland (Bent 1987, Quakenbush et al. 1995, Solovieva 1997); the greatest breeding densities were found near Barrow (Quakenbush et al., 2002), although they do not breed every year when present (Suydam, 1997b). The calculated average nesting density across the North Slope during 2002–2006 was 0.0045 birds/km² (USDOI, FWS, 2007).

Paired male Steller's eiders depart the North Slope after the nest is initiated in mid- to late June. Female eiders and their young-of-the-year typically depart the North Slope from late September to early October (Johnson and Herter, 1989). Unlike spectacled eiders, Steller's eiders do not molt in the Chukchi Sea. During molt migration, Alaskan breeding Steller's eiders stop and rest in areas of the Alaska Chukchi Sea, often in nearshore waters (within 2 km or 1 nmi of shore) near Ledyard Bay and Icy Cape. There is less use at more northerly locations near Wainwright and Peard Bay. More males than females migrate from Alaska to areas along the coast of Chukotka, while males that do not go to Chukotka spend more time on the Alaska Chukchi Sea coast.

Kittlitz's Murrelet

Kittlitz's Murrelet is listed as a candidate species (Listing Priority Number 2) throughout Alaska under the ESA. This species may nest as far north as Cape Beaufort (100 km northeast of Cape Lisburne) in the Amatusuk Hills. Observations of breeding Kittlitz's murrelets are sparse along the Alaskan Chukchi coast. Thompson, Hines, and Williamson (1966) observed a nest several miles inland on the Lisburne Peninsula northeast of Cape Thompson near Angmakrok Mountain. Breeding farther north is unlikely due to lack of suitable habitat (Day, Kuletz, and Nigro, 1999). These birds are solitary nesters and extensive survey efforts are required to determine local abundance.

Murrelet foraging areas may occur in or near the Chukchi Sea Planning Area. Kittlitz's murrelets have been observed on a regular basis in the Chukchi Sea as far north and east as Point Barrow (Bailey, 1948) and could occur in the Beaufort Sea (USDOI, FWS, 2006a). Regular observations of

Kittlitz's murrelets at sea were noted in late summer and early fall by Divoky (1987), but they have not been subsequently observed by others on similar cruises in the Chukchi Sea. This suggests that there is a great deal of annual variation in their occurrence in the Chukchi Sea.

New information for SEIS analysis of natural gas development and production

With respect to threatened and endangered species, the following new information was reviewed. During 2006–2009 open-water seasons, marine mammal observer (MMO)-monitoring associated with seismic surveys, barging, and marine research in the Chukchi Sea documented sightings of fin whales and humpback whales.

The two sightings of fin whale in the Chukchi Sea during the 2006–2009 open water seasons do not provide sufficient evidence for NMFS to alter their opinion that fin whales are not expected to occur in the northeastern Chukchi Sea or the Chukchi Sea Planning Area (USDOC-NMFS, 2008). Fin whales are still considered rare in the Chukchi Sea Planning Area.

The 2006-2009 sightings confirmed humpback use of the western Beaufort Sea and Chukchi Sea Planning Areas, and adjacent areas in the southeast Chukchi Sea. The humpback whales recently sighted in the Chukchi Sea and Beaufort Sea most likely belong to the Western North Pacific Stock. The humpback whale's known summer feeding habitats include the southern portion, especially the southwestern portion, of the Chukchi Sea.

This new information resulted in reinitiation of ESA consultation with NMFS for OCS activities in the Chukchi Sea and Beaufort Sea Planning Areas. The 2008 Biological Evaluation (BE) (USDOI, MMS, 2008) and the 2008 BO (USDOC, NMFS, 2008) provide additional information on these sightings. These documents are on the BOEM website http://alaska.boemre.gov/ref/Biological_opinions_evaluations.htm.

On May 15, 2008, FWS listed the polar bear as threatened throughout its range (73 *FR* 28212-28303). The FWS concurrently published an Interim Final 4(d) Rule, which provides guidance on the implementation of the ESA. This special rule adopts the existing conservation regulatory requirements in place under the Marine Mammal Protection Act of 1972 as amended (MMPA) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) as the appropriate regulatory provisions for this threatened species.

The BOEM reinitiated ESA Section 7 consultation with FWS in 2009. This consultation addressed the new information on listing the polar bear as threatened, and updated information on ESA listed species, potential effects, and the Arctic environment. In July 2009, BOEM provided an updated Biological Evaluation to FWS for consultation on Steller's eider, spectacled eider, Kittlitz's murrelet, yellow-billed loon, and polar bear. The FWS provided their Biological Opinion to BOEM on September 3, 2009 (USDOI, FWS, 2009).

On October 29, 2009, FWS published a proposed rule in the *Federal Register* identifying proposed Critical Habitat for the Polar Bear (74 *FR* 56058–56086). The proposed rule identifies the physical and biological features essential to the conservation of the polar bear. The FWS has identified land-fast sea ice (sea ice that is frozen to the shoreline or to the seafloor and is relatively immobile) and pack ice (annual and multi-year ice that is in constant motion due to winds and currents) as critical habitat [74 *FR* 56059]. Barrier islands were proposed critical habitats. Denning habitats and open water were not considered essential features for polar bears along the Chukchi Sea [74 *FR* 56065].

In light of this new information, potential impacts to polar bears will be analyzed in the "Threatened and Endangered Marine Mammals" subsection of Chapter 4. Analysts reviewed additional information for natural gas development and production. With respect to other marine mammals, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

Analysts' review identified no new information regarding threatened and endangered marine and coastal bird that would change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.B.5. Marine and Coastal Birds

Most birds occurring in the Chukchi Sea area are present on a seasonal basis. During spring migration, arrival times at coastal breeding areas usually coincide with the formation of leads. Many seabirds (such as murres) and sea ducks (such as common eiders and long-tailed ducks) will closely follow leads that typically form along the edge of the landfast ice. Migration times vary between species, but spring migration for most species takes place between late March and late May. Many birds that breed on the North Slope must migrate through the Sale 193 area twice each year. Departure times from the Beaufort and Chukchi seas during postbreeding or fall migration vary between species and often by sex within the same species, but most marine birds will have moved out of the Chukchi Sea by late fall before the formation of sea ice. The following sections summarize movement patterns, locations, and life history characteristics for several key avian groups.

Cliff-Nesting Seabirds

Common murres and thick-billed murres

Common murres and thick-billed murres breed as far north as Cape Lisburne and farther south at Cape Thompson. If the colony is reduced in size below a certain threshold, the colony is abandoned and can remain so for decades. Murres are primarily piscivorous and rely on dispersed schools of offshore fish. Based on limited data, murre foraging areas overlap with the area considered in the proposed sale (Fig. III.B-7). Also, as a result of molting and foraging in late summer and fall, flightless males and young are vulnerable to disturbances and spills. Flightless individuals are not capable of undertaking large scale movements to other areas.

Horned puffin and tufted puffin

The horned puffin and the tufted puffin are found in the Chukchi Sea area, where they breed in colonies. SOWS, Hatch, and Lensink (1978) reported the horned puffin was the most abundant puffin species in the Chukchi Sea with breeding colonies at Cape Lisburne and Cape Thompson. They can breed on suitable beach habitat on islands nearshore by digging burrows or hiding under large pieces of driftwood or debris. Horned puffins are primarily piscivorous and rely on dispersed schools of offshore fish. In other areas of Alaska, breeding colonies of horned puffins have been reported to forage in excess of 100 km offshore (Hatch et al., 2000).

Black-legged kittiwake

Breeding colonies of the black-legged kittiwake in the Chukchi Sea (Cape Thompson and Cape Lisburne) are at the northern limit of their breeding range in Alaska. Data collected between 1960 and 1978 reported approximately 48,000 black-legged kittiwakes bred along the Chukchi Sea coast between Cape Thompson and vicinity to Cape Lisburne (USDOI, FWS, 2005a). Divoky (1987) reported black-legged kittiwakes were abundant from mid-July until late September in the Chukchi Sea north of Cape Thompson, where they range far offshore through most of the area considered for the lease sale. Divoky (1987) estimated over 400,000 black-legged kittiwakes in the pelagic Chukchi Sea. The portion of this population in the proposed lease sale area is substantial late in the open-water season.

Bering Sea Breeders and Summer Residents

Northern fulmar

The northern fulmar does not breed along the Chukchi Sea coast, and those observed in this area during the spring and summer are nonbreeders or failed breeders from southern areas. Divoky (1987)

estimated 45,000 northern fulmars in pelagic waters of the Chukchi Sea (typically south of Cape Lisburne) during late August to mid-September.

Short-tailed shearwater

The short-tailed shearwater in the Chukchi Sea are most common in the southern portion, and are routinely found in the proposed sale area from late August to late September. At northern latitudes, short-tailed shearwaters likely forage on dense patches of euphausiids and amphipods.

Auklets

Three species of auklets, (parakeet, least, and crested) breed as far north as the Bering Strait (Sowls, Hatch, and Lensink, 1978), but move into the Chukchi Sea, including much of the proposed lease sale area, from late August into early October.

High Arctic-Associated Seabirds

Black guillemot

Black guillemot breeding individuals in the Chukchi Sea range from Cape Thompson northward (Roseneau and Herter, 1984). Despite the relatively small breeding population in Alaska (the Chukchi and Beaufort seas have a combined total of fewer than 2,000 birds), the pelagic population in the Chukchi Sea is estimated to be around 70,000 (Divoky, 1987). Black guillemots remain closely associated with sea ice throughout their lifetime, where they feed extensively on arctic cod (Divoky, 1987).

Ross' gull

Ross' gulls may be encountered near Point Barrow. Many migrate south through the Chukchi Sea and pass through the Bering Strait to winter in the Bering Sea.

Ivory gull

The ivory gull is uncommon to rare in pelagic waters of the Chukchi Sea during summer, and small numbers migrate through in fall to wintering areas in the northern Bering Sea. Divoky (1987) reported that ivory gulls are closely associated with the ice edge throughout their lifecycle.

Arctic tern

The Arctic terns are rare in the pelagic waters of the Chukchi Sea (Divoky, 1983). Dau and Larned (2005) observed more than 600 Arctic terns between Omalik Lagoon and Point Barrow, with the majority located in Kasegaluk Lagoon near the village of Point Lay.

Tundra-Breeding Migrants

Jaegers

The three species of jaegers (pomarine, parasitic, and long-tailed) are common in the Chukchi Sea in summer until late September, when they move south to the Bering Sea (Divoky 1987). Jaegers are dispersed throughout pelagic areas of the Chukchi Sea, with no obvious high concentration areas.

Glaucous gull

Glaucous gulls typically occur in low densities in the Chukchi Sea, but commonly congregate at food sources (Divoky, 1987). They are most common in the Chukchi Sea from late July to late September within 70 km of shore between Icy Cape and Barrow. Most glaucous gulls in the Chukchi Sea area breed inland near freshwater, but some breed at coastal seabird colonies (Divoky, 1987; Sowls, Hatch, and Lensink, 1978).

Waterfowl

Loons

Pacific loons are the most common loon species migrating along the Chukchi Sea coast, although red-throated and yellow-billed loons are present in fewer numbers. Yellow-billed loons typically nest near large, deep, tundra lakes where they nest on low islands or near the edges of lakes to avoid terrestrial predators (Johnson and Herter, 1989). Red-throated loons nest on smaller ponds than yellow-billed or Pacific loons. In spring, loons typically migrate along coastal routes, although some may migrate using inland routes (Johnson and Herter, 1989). Most loons stay very close to shore during fall migration until they reach the Lisburne Peninsula, where they head farther out to sea towards the Bering Strait (Divoky 1987). Most of the postbreeding loon migration takes place in September. Low numbers, patchy distributions, and specific habitat requirement may make yellow-billed loons more susceptible to environmental perturbations such as disturbance, habitat alterations, and oil spills than species that are more abundant, widely distributed, and able to exploit a greater diversity of habitats (Hunter, 1996).

Long-tailed duck

The long-tailed duck is a common species in the Chukchi Sea after the first week of September until late October. Typical migration distances offshore for long-tailed ducks, as well as other species, are along the 20-m isobath. Many long-tailed ducks molt in Kasegaluk Lagoon and Peard Bay on the Chukchi Sea coast (Johnson, Frost, and Lowry, 1992; Kinney, 1985). Molting long-tailed ducks tend to stay in or near the lagoons, especially near passes between the lagoon and the sea (Johnson, Wiggins, and Wainwright, 1992). Brackney and Platte (1986) observed long-tailed ducks feeding heavily in passes between barrier islands (Lysne, Mallek, and Dau, 2004).

Common eider

The common eider typically migrates during spring along the Chukchi Sea coast using offshore open-water leads. Common eiders nest on barrier islands or spits along the Chukchi Sea coast (Johnson and Herter, 1989). Most common eiders nest on barrier islands or spits along the Chukchi Sea coast (Johnson and Herter, 1989). During a 2005 aerial survey conducted in late June to coincide with the common eider egg laying and early incubation period, 742 eiders were observed between Omalik Lagoon and Point Barrow. Most common eiders were observed in Kasegaluk Lagoon and Peard Bay (Dau and Larned, 2005). Beginning in late June, postbreeding male common eiders begin moving towards molting areas in the Chukchi Sea; by July and August, most common eiders in the Chukchi Sea are molting males. Most breeding female common eiders and their young begin to migrate to molt locations in late August and September. Common molt areas in Alaskan waters in the Chukchi Sea are near Point Lay, Icy Cape, and Cape Lisburne (Johnson and Herter, 1989). The Peard Bay area was particularly important to molting eiders (Kinney, 1985). After the molt is completed, some common eiders move offshore into pelagic waters, but most eiders remain close to shore (Divoky, 1987).

King eider

Most king eiders begin to migrate through the Chukchi Sea during spring and arrive in the Beaufort Sea by the middle of May (Barry, 1968). The location and timing of offshore leads along the Chukchi Sea is a major factor determining routes and timing of king eider migration (Barry, 1986). Powell et al. (2005) reported that Ledyard Bay may be a critical stopover area for foraging and resting during spring migration. Many male king eiders move to staging areas along the Chukchi Sea, including Ledyard Bay, in mid- to late July (Dickson, Suydam, and Balogh, 2000; Dickson, Balogh, and Hanlan, 2001). The Peard Bay area is also particularly important to molting eiders (Kinney, 1985), and the typical staging time in Ledyard Bay was reported at 17–24 days (range 1–48 days). Most

king eiders nest on the North Slope between Icy Cape and the western boundary of the Arctic National Wildlife Refuge.

Brant

Many brant migrate along the west coast of Alaska en route to breeding areas on the North Slope or the Canadian High Arctic. Brant typically nest on offshore spits, barrier islands, or on islands formed in large river deltas. In June black brant have been observed along the Chukchi Sea coast in Kasegaluk Lagoon and Peard Bay (Dau and Larned, 2005). Kasegaluk Lagoon also is an important stopover location during postbreeding migration.

Greater white-fronted goose

The greater white-fronted goose breeds along the coasts of the Bering, Chukchi, and Beaufort seas. In northern portions of Alaska, these geese typically breed within 30 km of the coast (Johnson and Herter, 1989, citing King, 1970). Most greater white-fronted geese reach Alaska via the Central and Pacific Flyways and reach North Slope breeding grounds using overland routes (Johnson and Herter, 1989). In 1989–91, Johnson, Wiggins, and Wainwright (1992) observed as many as 4,205 white-fronted geese during one aerial survey of Kasegaluk Lagoon; the peaks of migration out of Kasegaluk lagoon appeared to be in the first week of June and the last week of August.

Kasegaluk Lagoon supports one of two consistently used nesting colonies for lesser snow geese in the United States.

Tundra swans

Tundra swans have been observed in Kasegaluk Lagoon with flightless young-of-the-year birds indicating that tundra swans breed in Kasegaluk Lagoon (Johnson, Wiggins, and Wainwright, 1992).

Shorebirds

Although many shorebirds breed on tundra, they also rely on coastal areas such as beaches, barrier islands, lagoons, and mudflats for some portion of their lifecycle. These coastal areas are especially important habitats where shorebirds replenish energy reserves after breeding and prior to southward migration. The most common shorebird species breeding on the Arctic Coastal Plain include dunlin, semipalmated sandpiper, pectoral sandpiper, and red phalarope (Alaska Shorebird Working Group [ASWG], 2004). Many shorebirds leaving the Beaufort Sea move west along the Chukchi Sea coast. It appears reasonable to assume that large numbers of shorebirds move west along the Chukchi Sea coast, stopping at high-productivity sites to replenish energy reserves and rest.

Phalaropes

Both red and red-necked phalaropes are present in the Chukchi Sea during the open-water periods. Phalaropes are common in pelagic waters as well as within a few meters of shore, where their distribution typically is tied to zooplankton abundance. Due to their reliance on zooplankton, their distribution is patchy and variable; however, because they are tied to a moving prey source they may be encountered throughout the Chukchi Sea in varying concentrations. During aerial surveys conducted in Kasegaluk Lagoon from 1989–91, phalaropes were the most numerous shorebirds present. Based on ground observations, red phalaropes are considered more common than red-necked phalaropes in Peard bay and Kasegaluk Lagoon. Phalaropes are one of the key species groups of shorebirds that use Kasegaluk Lagoon and Peard Bay, where they stage or stop over in nearshore marine and lacustrine waters (ASWG, 2004).

Dunlin

Two subspecies of Dunlin breed in Alaska. Dunlins are one of the key species of shorebirds that use Kasegaluk Lagoon, where they stage or stop over in silt tidal flats and salt-grass meadows (ASWG, 2004).

Raptors and Ravens

A variety of raptors and corvids may be present in the coastal zone along the Chukchi Sea coast adjacent to the proposed lease sale area. On the North Slope, raptors typically are more common within 20 km of the Brooks Range foothills (Johnson and Herter, 1989) and population densities are lower near the coast, especially during the breeding season. Snowy owls are the raptor most commonly encountered near Kasegaluk Lagoon.

New information for SEIS analysis of natural gas development and production

On March 25, 2009, the yellow-billed loon was listed as a candidate species (Listing Priority Number 8) throughout its range under the ESA (74 FR 12932).

The BOEM reinitiated ESA Section 7 consultation with FWS in 2009. This consultation addressed the new information on listing the yellow-billed loon as a candidate species, and updated information on ESA listed species, potential effects, and the Arctic environment. In July 2009, BOEM provided an updated Biological Evaluation to FWS for consultation on Steller's eider, spectacled eider, Kittlitz's murrelet, yellow-billed loon, and polar bear. The FWS provided their Biological Opinion to BOEM on September 3, 2009 (USDOI, FWS, 2009).

III.B.6. Other Marine Mammals

Eleven species of marine mammals occur in the Chukchi Sea and are not listed as endangered or threatened under the ESA.

Pinnipeds

Five species of pinnipeds are associated with sea ice in Alaskan waters: Pacific walrus and four species of phocid seals or ice seals (ringed, spotted, ribbon, bearded). All five species haul out on sea ice to rest, give birth, and molt, and they all exhibit seasonal migrations in conjunction with the seasonal advance and retreat of ice (Fay, 1974). Ribbon and spotted seals are thought to prefer the loose ice of the "ice front," whereas ringed seals, bearded seals, and walruses are thought to prefer more interior pack ice (Fay, 1974; Burns, Shapiro, and Fay, 1981; Simpkins et al., 2003).

Pacific walrus

Pacific walruses range throughout the shallow continental shelf waters of the Bering and Chukchi seas, where their distribution is closely linked with the seasonal distribution of the pack ice. Walruses are migratory, moving south with the advancing ice in autumn, and north as the ice recedes in spring (Fay, 1981). During the summer months, the majority of the subadults, females, and calves move into the Chukchi Sea, where they tend to concentrate in areas of unconsolidated pack ice within 100 km of the leading edge of the pack ice. In contrast, adult males generally abandon the sea ice in spring for coastal haulouts in Bristol Bay and the Gulf of Anadyr (Jay and Hills, 2005). By July, large groups of up to several thousand walruses can be found along the edge of the pack ice between Icy Cape and Point Barrow. Walruses rely on sea ice as a substrate for resting and giving birth (Angliss and Outlaw, 2005) and generally require ice thicknesses of 50 cm or more to support their weight (Fay, 1982). When suitable pack ice is not available, walruses will haul out to rest on land, preferring sites sheltered from wind and surf. Traditional haulout sites in the eastern Chukchi Sea include Cape Thompson, Cape Lisburne, Icy Cape, and the barrier islands off of Kasegaluk Lagoon. In low ice years, when the pack ice retreats northward of the continental shelf, walrus come ashore to rest and remain near foraging areas. By August, depending on the retreat of the pack ice, walruses are found farther offshore, with principal concentrations to the northwest of Barrow. As the pack ice advances at the end of the summer open-water season, large herds begin moving back down to the Bering Sea.

Walruses generally are found in waters <200 m deep along the pack ice margin where ice concentrations are <80% (Fay 1982; Fay and Burns, 1988). The juxtaposition of broken ice over

relatively shallow continental shelf waters is important to them for resting between feeding bouts, particularly for females with dependent young which may not be capable of deep diving or long term exposure to the frigid water. The shallow Chukchi Sea and eastern Siberian Sea serve as the main feeding grounds for the bulk of the Pacific walrus population in the summer and autumn (Kochnev, 2004). Walruses specialize in feeding on benthic macroinvertebrates (e.g., clams, snails, shrimp, crabs, worms) and prefer to forage in areas <80 m deep (Fay, 1982).

Ringed Seal

Ringed seals are year-round residents in the Chukchi and Beaufort seas, and are the most common and widespread seal species in the area. In winter and spring, the highest densities of ringed seals are found on stable, shorefast ice. Ringed seals seem to prefer icefloes >48 m in diameter and often are found in the interior pack ice, where sea-ice concentrations exceed 90% (Simpkins et al. 2003). In early summer, the highest densities of ringed seals in the Chukchi Sea are found in nearshore fast and pack ice (Bengston et al., 2005). During summer, ringed seals are found dispersed throughout open-water areas, although in some regions they move into coastal areas (Smith, 1987; Harwood and Stirling, 1992). In the late summer and early fall, ringed seals often aggregate in open-water areas where primary productivity is thought to be high (Harwood and Stirling, 1992). Few, if any, seals inhabit ice-covered waters shallower than 3 m due to water freezing to the bottom and/or poor prey availability caused by the limited amount of ice-free water (71 FR 9785). In Alaskan waters, the primary prey of ringed seals is arctic cod, saffron cod, shrimp, amphipods, and euphausiids (Kelly, 1988; Reeves, Stewart, and Leatherwood, 1992).

Spotted Seal

Spotted seals are common in the coastal Alaskan waters in ice-free seasons. They migrate south from the Chukchi Sea and into the Bering Sea in October-November (Lowry et al., 1998). Adult spotted seal principal foods are schooling fishes, although the total array of foods is quite varied. In the Arctic, their diet is similar to that of ringed seals, including a variety of fishes such as arctic and saffron cod, and also shrimp, and euphausiids (Kato, 1982; Quakenbush, 1988; Reeves, Stewart, and Leatherwood, 1992). Within their geographic range they are known to eat sand lance, sculpins, flatfishes, and cephalopods (mainly octopus). The juvenile diet is primarily crustaceans (shrimp).

Ribbon Seal

In Alaska, ribbon seals range northward from Bristol Bay in the Bering Sea and into the Chukchi and western Beaufort seas. They are found in the open sea, on pack ice, and rarely on shorefast ice (Kelly, 1988). As the ice recedes in May to mid-July, they move farther north in the Bering Sea, hauling out on the receding ice edge and remnant ice (Burns, Shapiro, and Fay, 1981). Recent information suggests that many ribbon seals migrate into the Chukchi Sea for the summer months (Kelly, 1988). Ribbon seals dive as deep as 200 m in search of food. They eat a variety of different foods, but their main prey is fish; they also are known to consume eelpouts, capelin, pricklebacks, arctic cod, saffron cod, herring, and sand lance. Foods other than fishes include cephalopods (primarily squid), shrimp, mysids, and crabs.

Bearded Seal

In Alaskan waters, bearded seals occur over the continental shelves of the Bering, Chukchi, and Beaufort seas (Burns, 1981). Seasonal movements of bearded seals are directly related to the advance and retreat of sea ice and to water depth (Kelly, 1988). During winter, most bearded seals in Alaskan waters are found in the Bering Sea. During summer, the most favorable bearded seal habitat is found in the central and northern Chukchi Sea, where they are found near the widely fragmented margin of the pack ice; they also are found in nearshore areas of the central and western Beaufort Sea during summer. Bearded seals predominantly are benthic feeders (Burns, 1981), feeding on a variety of invertebrates (crabs, shrimp, clams, and snails) and other food organisms, including arctic and saffron

cod, flounders, sculpins, and octopuses (Kelly, 1988; Reeves, Stewart, and Leatherwood, 1992). Bearded seals also feed on ice-associated organisms when they are present, allowing them to live in areas with water depths considerably deeper than 200 m. In some areas, bearded seals are associated with the ice year-round; however, they usually move shoreward into open-water areas when pack ice retreats. During the open-water period, bearded seals occur mainly in relatively shallow areas, preferring areas no deeper than 200 m (Harwood et al., 2005; Monnett and Treacy, 2005).

Cetaceans

Beluga Whale

Beluga whales of the Beaufort Sea and eastern Chukchi Sea stocks winter in the Bering Sea and summer in the Beaufort and Chukchi Seas, migrating around western and northern Alaska along the spring lead system in April and May (Richard, Martin, and Orr, 2001; Angliss and Outlaw, 2005). During June, July, and part of August it is likely that the ranges of the two stocks do not overlap much (Suydam, Lowry, and Frost, 2005). Most belugas move into shallow coastal or estuarine waters during at least a portion of the summer (Caron and Smith, 1990; Frost and Lowry, 1990). Eastern Chukchi belugas move into coastal areas along Kotzebue Sound and Kasegaluk Lagoon in late June and remain there until mid to late July (Suydam et al., 2001; Suydam, Lowry, and Frost, 2005). Stomach content analysis of belugas suggests feeding is not the major reason for their presence near Kasegaluk Lagoon during this time (Suydam, Lowry, and Frost, 2005). Some of the largest gravel beds in the Chukchi Sea occur in Kasegaluk Lagoon and research suggests these areas are likely used for molting (Frost, Lowry, and Carroll, 1993). The low saline content and warmer water exiting the lagoons may facilitate the molting process (Suydam, Lowry, and Frost, 2005).

After leaving coastal areas, it is believed the animals move northeastward and spend the remainder of the summer in the northern Chukchi and western Beaufort seas. During the late summer and autumn, most belugas migrate far offshore near the pack-ice front (Frost et al., 1988; Hazard, 1988; Clarke, Moore, and Johnson, 1993; Miller, Elliott, and Richardson, 1998) and deeper slope waters.

The main fall-migration corridor of beluga whales is ~100+ km north of the coast. Movements of tagged belugas indicate that the western Chukchi Sea is an autumn migratory destination, with many whales moving into Russian waters near Wrangel Island between mid-September and early October. They remain near Wrangel Island for weeks before moving south into the Bering Sea (Richard, Martin, and Orr, 2001). It is likely members from both stocks occur in similar places and at similar times during the fall migration (Suydam, Lowry, and Frost, 2005).

Most feeding is done over the continental shelf and in nearshore estuaries and river mouths. Principal species eaten include arctic and saffron cods, herring, capelin, smelt, salmon, flatfishes, char, whitefish, and sculpins (Frost and Lowry, 1990; Richard, Martin, and Orr, 2001). Octopus, squid, shrimp, crabs, and clams are eaten occasionally. Belugas generally are associated with ice and relatively deep water throughout the summer and autumn, which may reflect their preference for feeding on ice-associated arctic cod (Moore et al., 2000).

Killer Whale

Killer whales occur along the entire Alaskan coast (Braham and Dahlheim, 1982), including the Chukchi Sea. Killer whales travel through the Bering Strait in the spring as the pack ice retreats and can be found in the Beaufort and Chukchi seas until fall, when the ice advances.

Harbor Porpoise

In Alaska, three separate stocks have been recommended; the Bering Sea stock is the only stock expected to be present in the action area. Harbor porpoises occur mainly in shelf areas (Read, 1999), diving to depths of at least 220 m and staying submerged for more than five minutes (Harwood and Wilson, 2001). Harbor porpoises typically occur in small groups of only a few individuals (Read,

1999); however, they can be observed in larger aggregations during feeding or migration. Harbor porpoises feed on a variety of small, schooling fish and cephalopods (Read, 1999).

Gray Whale

During the summer months, eastern north Pacific gray whales and their calves feed in the northern Bering and Chukchi seas (Tomilin, 1957; Rice and Wolman, 1971; Braham, 1984; Nerini, 1984). Gray whales prefer areas of little or no ice cover (<5%) (Moore and DeMaster, 1997). They are a coastal species, spending most of their time in waters <60 m deep. In mid-October, the whales begin their migration to the west coast of Baja California and the east coast of the Gulf of California to breed and calve (Swartz and Jones, 1981; Jones and Swartz, 1984). The northbound migration starts in mid-February and continues through May (Rice, 1984).

Gray whales are bottom feeders, sucking sediment from the seafloor. Their primary prey is amphipods, although other food items are ingested. Although gray whales probably feed opportunistically throughout their range, they return annually to primary feeding areas in the northern Bering Sea and Chukchi Sea (Moore and Clarke, 2002). The northeastern-most recurring known gray whale feeding area is in the Chukchi Sea southwest of Barrow (Clarke, Moore, and Ljungblad, 1989). Gray whale feeding habits in the northern Chukchi Sea appear limited to shoal and coastal waters and their selection of shoal and coastal habitat is greatest in the summer (Moore et al., 2000). Shallow coastal areas and offshore shoals provide habitat rich in gray whale prey.

Minke Whale

Aerial surveys suggest that minke whales are associated with the 100-m contour in upper slope waters (Moore et al., 2000). They are either solitary or found in small groups, but they can occur in large aggregations associated with concentrations of prey in the higher latitudes. Minke whales feed on both fish (e.g., herring, sand lance) as well as on invertebrates (e.g., euphasiids, copepods).

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to other marine mammals, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.B.7. Terrestrial Mammals

Caribou, muskoxen, grizzly bear, and arctic fox are the terrestrial mammal species most likely to be affected by development and production of natural gas from the Chukchi Sea OCS. Other species, such as moose, are too sparse in the area to be affected by Chukchi Sea development.

Caribou

One large and two smaller caribou herds use habitats of Alaska's Arctic plain in the project area: the Western Arctic Herd (WAH), the Central Arctic Herd (CAH), and the Teshekpuk Lake Caribou Herd (TCH).

Caribou migrate seasonally to take advantage of seasonally available forage resources. Spring migration of parturient female caribou from the overwintering areas to the calving grounds starts in late March (Hemming, 1971). Bulls and nonparturient females generally migrate later.

Calving takes place in the spring, generally from late May to late June (Hemming, 1971). Traditional calving grounds consistently provide high nutritional forage to lactating females during calving and nursing periods, which is critical for the growth and survival of newborn calves. The WAH calving area is inland on the NPR-A, west of the Proposed Action area. The TCH's central calving area generally is located on the east side of Teshekpuk Lake and near Cape Halkett adjacent to Harrison

Bay. The CAH generally calves within 30 km of the Beaufort coast between the Itkillik and Canning rivers.

During the postcalving period in July through August, caribou generally attain their highest degree of aggregation with continuous masses of animals in herds, sometimes in excess of tens of thousands. Cow/calf groups are most sensitive to human disturbance during this period.

Insect-relief areas also become important during late June to mid-August during the insect season (Lawhead, 1997). For insect relief, caribou use various coastal and upland habitats such as sandbars, spits, river deltas, some barrier islands, mountain foothills, snow patches, and sand dunes, where stiff breezes prevent insects from concentrating and alighting on the caribou.

Muskoxen

There are muskoxen west of Prudhoe Bay as far as Fish Creek in northern NPR-A and quite a few in the Itkillik Hills south of Kuparuk all the way to the Colville River. Distribution of muskoxen during the calving season, summer, and winter are similar (Reynolds, 1992). Muskoxen in the Chukchi Sea coastal area are likely transitory lone bulls coming from populations that breed east of the Colville River. The most important habitats for muskoxen appear to be riparian, upland shrub and moist sedge-shrub meadows (Johnson et al., 1996).

Grizzly Bear

On the North Slope, grizzly dens occur in pingos, banks of rivers and lakes, sand dunes, and steep gullies in uplands (Harding, 1976; Shideler and Hechtel 2000). Grizzly bears in the western Brooks Range use a variety of food sources, seasonally including the WAH, beach-cast marine mammal carcasses and, to a small degree, fish runs that occur in major Chukchi coast drainages.

Arctic Fox

The availability of winter food sources directly affects fox abundance and productivity (Angerbjorn et al., 1991). Development at the Prudhoe Bay oil fields probably has led to increases in arctic fox abundance and productivity (Burgess, 2000) as foxes readily use development sites for feeding, resting, and denning, and their densities are greater in the oil fields than in surrounding undeveloped areas (Eberhardt et al., 1982; Burgess et al., 1993).

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to terrestrial mammals, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.B.8. Vegetation and Wetlands

Vegetation

The following paragraphs describe the most common vegetation types found up to 50 km inland from the Chukchi Sea shoreline. The description of vegetation in the study area is based on studies conducted by the Circumpolar Arctic Vegetation Mapping Team (2003).

Sedge, Moss, Dwarf-Shrub Wetlands

These wetlands are the most abundant vegetation type within the 50-km belt and cover about 41% of the area.

Tussock Sedge, Dwarf Shrub, Moss Tundra

This plant community, classified as moist tussock tundra, is the second most abundant within the 50-km belt and covers about 24% of the area.

Sedge/Grass Moss Wetland

This vegetation type covers about 9% of the area within the 50-km belt.

Erect Dwarf-Shrub Tundra

This tundra community covers about 8% of the area within the 50-km belt.

Nontussock Sedge, Dwarf-Shrub, Moss Tundra

This moist tundra plant community covers about 6% of the area evaluated within 50-km belt.

Noncarbonate Mountain Complex

This vegetation type covers about 6% of the area within the 50-km belt, and is found on mountains and plateaus with noncarbonate bedrock.

Carbonate Mountain Complex

This vegetation type covers about 4% of the area within the 50-km belt, and is found on mountains and plateaus with limestone and dolomite bedrock.

Sedge, Moss, Low-Shrub Wetland

This vegetation type covers about 1% of the area within the 50-km belt.

Low-Shrub Tundra

This vegetation type covers about 1% of the area within the 50-km belt.

Wetlands

Estuarine wetland systems are found along the Chukchi Sea shoreline in enclosed and protected bays, which are partly obstructed, or with sporadic access to the open ocean (Cowardin et al., 1979). Large estuarine wetland complexes are found in Omalik Lagoon, Kasegaluk Lagoon, Icy Cape, Peard Bay, and Wainwright Inlet. These wetlands typically range from sandy/silt flatlands to emergent persistent wetlands dominated by several sedge species adapted to brackish-water conditions. Most of the intertidal biota of the Arctic is impoverished due to the effect of annual ice and the minimal tidal amplitude, so there is almost no littoral biota and few marine wetlands. Genera that are normally intertidal elsewhere in the world are found in the Arctic in subtidal ecosystems.

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to other vegetation and wetlands, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.C. Social Systems**III.C.1. Economy**

Economic activity is measured in the form of revenues, employment, and personal income. Alaska OCS activities contribute to economic activity in the North Slope Borough (NSB), State of Alaska, and Federal government.

The tax base in the NSB consists mainly of high-value property owned or leased by the oil industry in the Prudhoe Bay area. NSB oil and gas property tax revenues have exceeded \$180 million annually. In 2005, revenues from oil and gas property taxes were \$197 million, and total general fund revenues were \$220 million. The State of Alaska's tax base is comprised mostly of revenues from oil and gas production. Federal revenues are generated primarily from income and payroll taxes.

The NSB is the largest employer of permanent residents in the NSB. Very few North Slope residents have been employed by the oil and gas industry or supporting industries in and near Prudhoe Bay since production started in the 1970's. Local residents represent only about one percent of those hired for North Slope oil industry related jobs, with most North Slope oil-industry workers residing outside the NSB. Unemployment in the NSB has ranged from 3.5% to 10.1% between 1975 and 2007. Aggregate personal income for the NSB in 2006 was \$0.3 billion.

New information for SEIS analysis of natural gas development and production

In 2008, NSB revenues from oil and gas property taxes were \$235 million, and total general fund revenues were \$281 million. These figures do not represent a significant change from recent past years' totals, as NSB's revenues from these sources have remained rather steady.

Unemployment in the NSB has ranged from 3.5% to 5.3% between 1975 and 2010. Aggregate personal income for the NSB in 2008 was \$448 million, and per capita personal income was \$66,664. Again, this figure is generally consistent with aggregate personal income figures over recent past years.

III.C.2. Subsistence-Harvest Patterns

Generally, subsistence is considered hunting, fishing, and gathering for the primary purpose of acquiring traditional food. The Alaska National Interest Land Conservation Act (ANILCA) defines subsistence as the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing for personal or family consumption; and for customary trade (16 U.S.C. 3113). Subsistence activities are assigned the highest cultural values by the Inupiat and provide a sense of identity in addition to being an important economic pursuit. The sharing, trading, and bartering of subsistence foods structure relationships among communities, and the sharing of these foods helps maintain ties with family members elsewhere in Alaska.

Many studies have examined the relationship between subsistence and wage economies and how subsistence and wage activities are integrated into rural Alaskan socioeconomic systems. Within the NSB, both subsistence activities and wage economic opportunities are highly developed, and highly dependent on each other (Kruse, Kleinfeld, and Travis, 1981; Kruse, 1982, 1991; Harcharek, 1995; Shepro and Maas, 1999). Those individuals most active in subsistence activities tend to be those who are also very involved in the wage economy (e.g., to purchase a boat, fuel, guns, and ammunition). Full-time employment, however, limits the time a subsistence hunter can spend hunting to after-work hours.

Community Subsistence-Harvest Patterns

All of the communities adjacent to the Chukchi Sea Planning Area enjoy a diverse resource base that includes both marine and terrestrial animals. Generally, communities harvest the resources most available to them. Coastal/marine food resources include whales, seals, walruses, waterfowl, and fish. Terrestrial/aquatic resources include caribou, freshwater fishes, moose, Dall sheep, edible roots and berries, and furbearing animals. The aggregate community subsistence-harvest areas are extensive for the primary subsistence resources, including marine mammals (whales, seals, walruses, polar bears), caribou, fish, birds (and eggs), furbearers (for hunting and trapping), moose, Dall sheep, grizzly bears, small mammals, invertebrates, berries, edible roots, and fuel and structural material. Large portions of the marine subsistence-harvest areas of the Alaskan Chukchi subsistence communities are included in the Chukchi Sea Planning Area.

While subsistence-resource harvests differ from community to community, the resource combination of caribou, bowhead whales, and fish has been identified as the primary grouping of resources harvested. Caribou is the most important overall subsistence resource in terms of hunting effort, quantity of meat harvested, and quantity of meat consumed. The bowhead whale is the preferred meat and the subsistence resource of primary importance because it provides a unique and powerful cultural basis for sharing and community cooperation (Stoker, 1984, as cited by ACI, Courtneage, and Braund, 1984). Depending on the community, fish is the second or third most important resource after caribou and bowhead whales. Bearded seals and various types of birds are also considered primary subsistence species. Waterfowl are particularly important during the spring, when they provide variety to the subsistence diet. Seal oil from hair seals and bearded seals is an important staple and a necessary complement to other subsistence foods.

The subsistence pursuit of bowhead whales has major importance to the communities of Barrow, Wainwright, Point Hope, and Point Lay. Barrow's location at the demarcation point between the Chukchi and Beaufort seas is unique and Barrow is the only community adjacent to the Planning Area that harvests whales in the spring and fall. Wainwright, Point Hope, and Point Lay whale only during the spring season (NSB, 1998). Wainwright's marine subsistence activities focus on the coastal waters from Icy Cape in the south to Point Franklin and Peard Bay in the north. The Kuk River lagoon system is an important marine and wildlife habitat used by local Wainwright hunters. Point Hope's strategic location close to the pack-ice lead makes it uniquely situated for hunting the bowhead. Point Lay, about 90 mi southwest of Wainwright, sits on the edge of Kasegaluk Lagoon near the confluence of the Kokolik River with Kasegaluk Lagoon. Beluga whale is the village's preferred and pivotal marine mammal resource (Huntington and Mymrin, 1996; Huntington, 1999). But Point Lay men have recently pursued and obtained a bowhead whale quota for the community. Point Lay took one bowhead whale in the spring 2009 hunt.

The 193 FEIS provides information on annual harvests of subsistence resources for the Chukchi communities (see 193 FEIS, Tables III.C-4, III.C-5, III.C-6, III.C-7, III.C-8, and III.C-9). Summaries of the Chukchi Sea coastal communities and maps of each community's subsistence-harvest areas are included in the Chukchi Sea Oil and Gas Lease Sale 126 (USDOI, MMS, 1990a). Maps of the subsistence-harvest areas are included also in the Northwest NPR-A Final EIS (USDOI, BLM and MMS, 2003).

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to subsistence-harvest patterns, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.C.3. Sociocultural Systems

"Sociocultural systems" encompasses three organizing concepts: social organization, cultural values, and institutional organizations of communities. These concepts are interrelated.

Social organization

"Social organization" means how people are divided into social groups and networks. Social organization encompasses households and families, but also wider networks of kinship and friends which, in turn, are embedded in groups that are responsible for acquiring, distributing, and consuming subsistence resources. This fundamental Inupiat social organization is kin-related groups engaged in subsistence activities.

Cultural values

"Cultural values" means concepts regarding what is desirable that are widely shared explicitly or implicitly by members of a social group. The Inupiat culture on the North Slope has strong ties to the

natural environment. Cultural values, many of which are rooted in, maintained, and reinforced by the interrelatedness of social organization, include a close relationship with natural resources and an emphasis on kinship, maintenance of the community, cooperation, and sharing. Subsistence is a central activity that embodies these values, with bowhead whale hunting being the paramount subsistence activity. Family and kinship relationships are strong influences on contemporary life, shaping social interactions that include cooperative activities and sharing. Cultural values of the Inupiat include characteristics such as respect for Elders, cooperation, sharing, family and kinship, knowledge of language, hunting traditions, and respect for nature. Borough residents express concerns regarding effects of oil and gas activities on archaeological, historic, and traditional land use and the incorporation of traditional and contemporary local knowledge into development projects (URS Corporation, 2005:68–70).

Residents of the Chukchi Sea coastal communities have been remarkably consistent in their primary concerns during the more than 20 years of public hearings and meetings on State and Federal oil development on the North Slope. Cultural concerns mentioned include:

- A general fear of cultural change, especially in terms of the loss of a subsistence lifestyle, which may lead to social disruptions or social problems in local communities (including youth becoming less interested in traditional ways).
- Concern that an influx of population and other influences will disrupt and degrade Inupiat community life.
- Concern that oil and gas development will impose additional demands upon Inupiat communities and individuals such as numerous hearings and review of numerous documents.

Institutional organization

“Institutional organization” refers to the government and nongovernment entities that provide services to the community. Institutional arrangements focus primarily on the structure of borough, village, and tribal governments, and the Native regional and various village for-profit and not-for-profit corporations. But this could include extended institutional arrangements or voluntary organizations such as Search and Rescue. The government and nongovernmental organizations that make up the institutional organization of the area include the NSB, city governments, Tribal governments, Alaska Native Regional Corporations, village corporations, nonprofit corporations, and nongovernmental organizations, such as the Alaska Eskimo Whaling Commission (AEWC).

Each of the Chukchi Sea coastal communities, with the exception of Point Lay, has a city government. While certain municipal powers were turned over to the Borough, community governments play an important role in the administration of Borough programs and representing community interests. Federally recognized tribal governments in most Chukchi Sea Native villages are active in community government and in providing services. The NSB provides all utilities to Chukchi Sea coastal communities and subsidizes fuel costs. No roads connect these communities, and problems remain concerning high fuel costs, uncertain transportation, erosion, storm-surge flooding, unemployment, and the need for better utilities (Fuller and George, 1997; U.S. Corps of Engineers, 2005).

Point Hope, Point Lay, Wainwright, and Barrow have either a traditional village or Indian Reorganization Act Tribal council form of tribal government. The Inupiat Community of the Arctic Slope, the regional tribal government, has recently taken a more active and visible role in regional governance and in providing some services.

The Arctic Slope Regional Corporation (ASRC) runs several subsidiary corporations, and along with village profit and not-for-profit corporations, has provided employment and other services in the Borough’s communities. An in-depth profile of the ASRC and Alaska Native village corporations for Atkasuk (Atkasuk Corporation), Point Lay (Cully Corporation), Wainwright (Olgoonik Corporation),

Point Hope (Tikigaq), and Barrow (Ulkpaegvik Inupiat Corporation) is in Northern Economics, Inc. (2006) and URS Corporation (2005). Generally, much of the surface estate in and around the communities is owned by the village corporations, except in Barrow where land ownership is a mixture of public and private lands.

Nongovernment organizations, such as the AEWC and whaling captain's associations, play an important role in the management of resources vital to the subsistence and cultural needs of the communities.

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to socio-cultural systems, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.C.4. Archaeological Resources

There are two major locations for archaeological resources/historic properties in the Sale 193 area: offshore and onshore. Within these locations, archaeological resources/historic properties are identified and discussed as either prehistoric or historic.

Offshore Archaeological Resources

It is generally accepted that prehistoric human populations may have entered North America at around 12,000 years B.P. (see for example Hopkins, 1967; Bonatto and Salzano, 1997; Wang, et al., 2007; and Goebel, et al., 2008). BOEMRE uses a conservative date of 13,000 B.P. as the earliest possible human migration and occupation of Alaska in the analysis of prehistoric archaeology potential. Based on core data from the Beaufort and Chukchi seas, sea level low-stands corresponding to this age are probably around -55 m (see for example Hopkins, 1967; Elias, et al., 1992; and Darigo, et al. 2007). The BOEM has adopted a slightly deeper water depth of -60 m as representing the possible sea level still-stand corresponding to approximately 13,000 years B.P. Along this portion of the now submerged shelf, relict terrestrial landforms provide indicators of areas where there is a higher potential for archaeological sites to occur.

Any shipwrecks in the Sale 193 area beyond the areas of intensive ice gouging are more likely to be preserved than shipwrecks in State waters because wave action and ice are less likely to contribute to the breakup of ships in deeper waters. Two potential shipwreck locations have been identified in the Sale 193 area (see Map 7 of the 193 FEIS).

Onshore Archaeological Resources

Information for some of the approximately 83 known archaeological sites onshore in the Chukchi Sea coastal area is in the Alaska Heritage Resources Survey File (ADNR, 2006). Twenty-one sites along the shore in the Wainwright Quadrant, 52 sites in the Point Lay Quadrant, and 10 sites in the Point Hope Quadrant illustrate the archaeological-resource potential of the shore area along the Chukchi Sea coast. The Chukchi Sea coast is eroding at an average of about 0.3 m per year, periodically exposing new archaeological sites.

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to archeological resources, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

III.C.5. Environmental Justice

Alaska Inupiat Natives, a recognized minority, are the predominant residents of the NSB. The ethnic compositions of Barrow, Atkasuk, Wainwright, Point Lay, and Point Hope are shown in Table III.C-

15 in the 193 FEIS. The table shows that these communities would be classed as minority communities on the basis of their proportional American Indian and Alaska Native membership. Low income commonly correlates with Native subsistence-based communities in coastal Alaska; however, subsistence-based communities in the region qualify for Environmental Justice analysis based on their racial/ethnic minority definitions alone (USDOC, Bureau of the Census, 2000, 2002). Inupiat Natives are the only minority population allowed to conduct subsistence hunts for marine mammals in the region and, in potentially affected Inupiat communities, there are not substantial numbers of “other minorities.” Effects on Inupiat Natives could occur because of their reliance on subsistence foods, and OCS activities may affect subsistence resources, subsistence harvest practices, and sociocultural systems.

New information for SEIS analysis of natural gas development and production

Analysts reviewed additional information for natural gas development and production. With respect to environmental justice, this information would not change the analysis or alter the conclusions discussed under environmental consequences in Chapter 4.

Chapter IV. Environmental Consequences

IV.A. Basic Assumptions for Effects Assessment

IV.A.1. Significance Thresholds

The Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations (40 CFR 1508.27) define the term “significantly” in terms of both context and intensity. “Context” considers the setting of the Proposed Action, what the affected resource might be, and whether the effect on this resource would be local or more regional in extent. “Intensity” considers the severity of the impact, taking into account such factors as whether the impact is beneficial or adverse; the uniqueness of the resource (for example, threatened or endangered species); the cumulative aspects of the impact; and whether Federal, State, or local laws may be violated. The significance thresholds used in the 193 FEIS and this SEIS use terminology that is consistent with that definition. Impacts may be beneficial or adverse. Impacts are described in terms of frequency, duration, general scope, and/or size and intensity.

The impact analyses address the significance of the impacts on the resources with consideration of such factors as the nature of the impact (for example, habitat disturbance or mortality), the spatial extent (local and regional), and recovery times (years, generations), and the effects of mitigation (e.g., implementation of the oil-spill-response plan). Adverse impacts that are reduced by required mitigation to below the “significance thresholds” are considered “not significant.”

This SEIS adopts the significance thresholds used in the 193 FEIS. The following are descriptions of significance thresholds from the 193 FEIS for the resources considered.

Water Quality

A significant effect on water quality is determined by any of the following: A regulated contaminant is discharged into the water column, and the resulting concentration outside a specified mixing zone is above the acute (toxic) State standard or Environmental Protection Agency (USEPA) criterion more than once in a 1-year period and averages more than the chronic State Standard or USEPA criterion over 25 square kilometers (km²) for a month. The spillage of crude or refined oil in which the total aqueous hydrocarbons in the water column exceeds 1.5 parts per million (ppm), the assumed acute (toxic) criterion, for more than 3 days over at least 10 km² and 15 parts per billion (ppb), the assumed chronic criteria, and the State of Alaska ambient-water-quality standard, for more than a month over 25 km². An increase in anthropogenic contaminants in regional sediments to levels that have resulted in adverse biological effects in 10% of tested organisms (Effects Range-Low; Long et al., 1995; Long, Field, and Macdonald, 1998). Violations would be caused by exceeding an effluent limit or creating an oil sheen. The accidental discharge of a small volume of crude or refined oil also might cause an adverse impact. However, an action of violation or accidental discharge of a small volume of crude or refined oil would not necessarily constitute a significant environmental impact as defined in 40 CFR 1508.27.

Air Quality

A significant effect on air quality is determined by the following: Emissions cause an increase in pollutants over an area of at least a few tens of square kilometers that exceeds half the increase permitted under the Prevention of Significant Deterioration (PSD) criteria or the National Ambient Air Quality Standards (NAAQS) for nitrogen dioxide, sulfur dioxide, or particulate matter <10 microns (μ) in diameter; or exceeds half the increase permitted under the NAAQS for carbon monoxide or ozone.

Biological Resources

A significant effect on biological resources is determined as follows: an adverse impact that results in a decline in abundance and/or change in distribution requiring three or more generations for the indicated population to recover to its former status. Biological resources include whales, seals, walrus, marine and coastal birds, terrestrial mammals, lower trophic-level organisms, and fishes.

Threatened and Endangered Species

A significant effect on threatened or endangered species is determined by an adverse impact that results in a decline in abundance and/or change in distribution requiring one or more generations for the indicated population to recover to its former status. For declining populations, any take identified during the Section 7, ESA consultation process would constitute a significant impact.

Economy

A significant effect on the economy is determined as follows: economic effects that would cause important and sweeping changes in the economic well-being of the residents or the area or the region. Local employment is increased by 20% or more for at least 5 years.

Subsistence-Harvest Patterns

A significant effect on subsistence-harvest patterns occurs when one or more important subsistence resources becomes unavailable, undesirable for use, or available only in greatly reduced numbers for a period of 1-2 years.

Sociocultural Systems

A significant effect on sociocultural systems is defined by a chronic disruption of sociocultural systems that occurs for a period of 2-5 years with a tendency toward the displacement of existing social patterns.

Environmental Justice

Significant effects in this category include impacts on human health or environment that cause disproportionate, high adverse effects on minority or low-income populations. This threshold would be reached if one or more important subsistence resources becomes unavailable, undesirable for use, or available only in greatly reduced numbers for a period of 1 to 2 years; or chronic disruption of sociocultural systems occurs for a period of 2 to 5 years, with a tendency toward the displacement of existing social patterns. Tainting of subsistence foods from oil spills and contamination of subsistence foods from pollutants would contribute to potential adverse human health effects.

Archaeological Resources/Historic Properties

Significant effects on archaeological resources or historic properties are indicated when an interaction between an archaeological site and an effect-producing factor occurs and results in the loss of unique, archaeological information.

IV.B. Analysis Scenario

IV.B.1. Summary

The natural gas development and production scenario below (see also Figure 2) provides the framework for BOEM's analysis in response to the July 2010 remand from the U.S. District Court for the District of Alaska (Native Village of Point Hope v. Salazar, No. 1:08-cv-00004-RRB [D. Alaska]). The scenario is based on our review of the exploration, development, and production scenario in the 193 FEIS, options for gas production and transportation, information on current and planned North Slope infrastructure, and the professional judgment of BOEM staff.

Year	GOR 1160	Recovery Dissolved gas MMcf/day	Consumed BCF/yr 0.25	Injected BCF/yr	Second gas recovery NA-gas BCF/yr	Consumed Gas rate MMcf/d	Gas sales BCF 0.1	Gas sales BCF/yr	Gas sales MMcf/d	Gas Production wells
2005										
2006										
2007										
2008										
2009										
2010										
2011										
2012										
2013										
2014										
2015										
2016										
2017										
2018										
2019										
2020		62.6	172	13.5	49					
2021		81.2	222	17.5	64					
2022		95.1	261	20.5	75					
2023		95.1	261	20.5	75					
2024		95.1	261	20.5	75					
2025		95.1	261	20.5	75					
2026		83.7	229	18.0	66					
2027		73.7	202	15.9	58					
2028		64.8	178	14.0	51					
2029		57.0	156	12.3	45					
2030		50.2	138	10.8	39					
2031		44.2	121	9.5	35					
2032		38.9	107	8.4	30					
2033		34.2	94	7.4	27					
2034		30.1	82	6.5	24					
2035		26.5	73	5.7	21	50	13.7	5.0	45.0	123.3
2036		23.3	64	5.0	18	75	20.5	7.5	67.5	184.9
2037		20.5	56	4.4	16	100	27.4	10.0	90.0	246.6
2038		18.1	49	3.9	14	125	34.2	12.5	112.5	308.2
2039		15.9	44	3.4	12	150	41.1	15.0	135.0	369.9
2040		14.0	38	3.0	11	150	41.1	15.0	135.0	369.9
2041		12.3	34	2.7	10	150	41.1	15.0	135.0	369.9
2042		10.8	30	2.3	8	150	41.1	15.0	135.0	369.9
2043		9.5	26	2.1	7	150	41.1	15.0	135.0	369.9
2044		8.4	23	1.8	7	150	41.1	15.0	135.0	369.9
2045						150	41.1	15.0	135.0	369.9
2046						150	41.1	15.0	135.0	369.9
2047						150	41.1	15.0	135.0	369.9
2048						150	41.1	15.0	135.0	369.9
2049						150	41.1	15.0	135.0	369.9
2050						150	41.1	15.0	135.0	369.9
2051						120	32.9	12.0	108.0	295.9
2052						100	27.4	10.0	90.0	246.6
2053						80	21.9	8.0	72.0	197.3
2054						50	13.7	5.0	45.0	123.3
2055										
1160		250		910		2500		250		2250

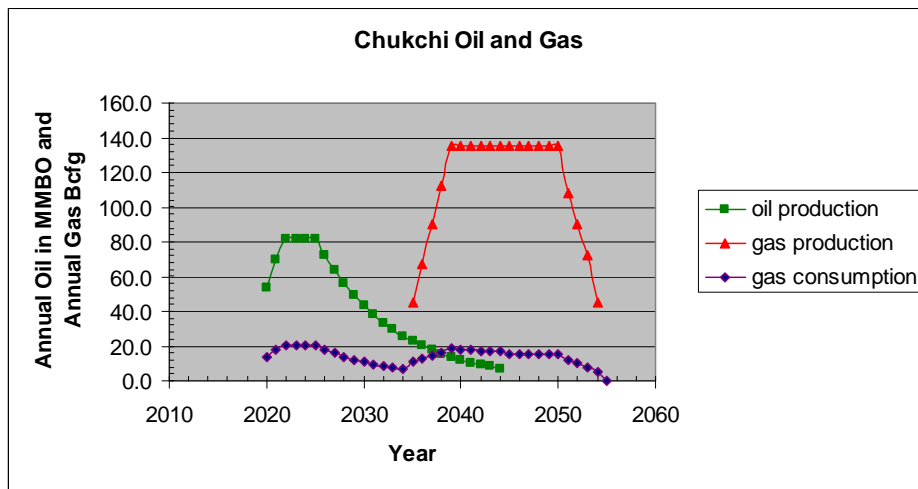


Figure 2. Scenario for subsequent gas production in the Chukchi OCS.

The 193 FEIS scenario presumes that oil, solution gas, and condensate would be recovered, but only oil and condensate would be transported off-lease for the first 15 years (from 2020 to 2035). Further, the scenario presumes that the TAPS oil pipeline system will continue to operate through at least 2044. The 193 FEIS scenario did not include production of natural gas. Natural gas in northern Alaska is described as “stranded” until a gas-transportation system to outside markets is constructed. At the time of preparation of the 193 FEIS, a large-diameter gas pipeline was considered the most likely transportation system; however, there were no specific proposals being considered at that time. The BOEM considered it unrealistic to assume that natural gas would be economical to produce from the Chukchi Sea Planning Area until construction and operation of a gas-transportation system seemed likely.

Since completion of the 193 FEIS, the Alaska Gasline Inducement Act (AGIA) was passed by the State of Alaska to encourage construction of a gas pipeline from the North Slope to market. In addition, in 2007, BP and ConocoPhillips proposed the Denali pipeline project. Given these events, BOEM considered the construction and operation of a gas-transportation system more likely (but not necessarily reasonably foreseeable) and included production of natural gas from the Chukchi Sea Planning Area in the 2008 Arctic MultiSale Draft EIS (USDOJ, MMS, 2008). Appendix E of the Arctic MultiSale Draft EIS provides a discussion of past and current gas pipeline proposals.

For this SEIS, BOEM estimates that approximately 500 million cubic feet of gas will be consumed as fuel by offshore and onshore facilities, leaving a gas sales volume of 2.25 trillion cubic feet (see Figure 2). Gas production would be phased-in around 2035, and peak gas production would start in 2039. All gas reserves would be depleted in 2054 (see Figure 2). During a 10-year transition period (2035 to 2044), both oil and gas would be produced from the offshore platform. Infrastructure required to support these activities includes a platform with topside facility, numerous wells, an offshore oil pipeline, an onshore processing facility, and an onshore pipeline through the NPR-A region.

IV.B.2. Background

Scenarios are conceptual views of the future and represent possible sets of activities. To develop scenarios, we consider the petroleum-resource potential of an area, the technology to develop and produce oil and gas from the offshore area, and industry trends in northern Alaska. While scenarios provide a reasonable basis for analyzing the effects of future activities, the presence and location of commercial oil or gas accumulation is purely hypothetical until proven by drilling. The primary purpose of a scenario is to provide a common basis for the analysis of potential environmental impacts, should future activities occur.

BOEM technical experts have reviewed the scenario laid out in the 193 FEIS (see 193 FEIS, Section IV.A.) and determined that it remains valid. The Proposed Action was presumed to result in leasing and exploration of the Chukchi Sale area, as well as the discovery, development and production of one large oil field. Recoverable oil resources from this field were presumed (for this scenario) to be one billion barrels—lower oil volumes are not likely to be economically viable in this remote, high-cost location. At such a volume, an oil discovery could also be associated with a large volume of natural gas, in solution with oil and as a separate gas cap. Total potential of the initial reserve could be 2.75 trillion cubic feet.

Oil is a more valuable commodity than gas; this is not expected to change in the foreseeable future. Consequently, oil would be produced first. In a typical reservoir management strategy, solution gas recovered as a secondary product with oil is used as fuel for facilities, and the excess gas is injected into the reservoir to facilitate oil recovery. Later in the field life, as oil production rates decline towards depletion, gas can be produced for sale. The estimated timeframe for oil development activities is given in Figure 3. Overall, the timeframe from leasing to abandonment is projected to be 50 years.

IV.B.3. Infrastructure

Production would occur from a single platform; water depth and sea conditions are the two main factors in selecting a platform type. Because the continental shelf is relatively deep in the Chukchi (mostly deeper than 100 ft) and affected by ice movements most of the year (which precludes a floating production system), a large bottom-founded platform is likely to be used as a central facility. The platform would support 1-2 drilling rigs, production and service (injection) wells, processing equipment, fuel and production storage capacity, and quarters for personnel. The processing equipment installed on the platform would be initially designed for the peak oil and associated gas rates (approximately 225,000 barrels/day and 260 million cubic feet/day; see Figure 3).

Year	Seismic Surveys	Exploration Wells	Delineation Wells	Exploration Drilling Rigs	Production Platforms	On-Platform Wells	Subsea Wells	Service Wells	Production Drilling Rigs	In-Field Flowlines (miles)	Offshore Pipelines (miles)	New Shorebases	Annual Oil Production (MMbbl)	Daily Oil Production (bopd)
2005														
2006	4													
2007	4													
2008	4													
2009	3	1		1										
2010	3	1												
2011	2		2	1										
2012	1		2	1										
2013	1		2	1										
2014	1	1		1										
2015	1	1		1								1		
2016	1													
2017											30			
2018											30			
2019							8		2	5	30			
2020					1	6	8	3	3	5			54.0	147,945
2021						18	8	5	4	5			70.0	191,781
2022						18	8	5	4	5			82.0	224,658
2023						18	8	5	4	5			82.0	224,658
2024						10	8	6	3	5			82.0	224,658
2025						10		4					82.0	224,658
2026													72.2	197,699
2027													63.5	173,975
2028													55.9	153,098
2029													49.2	134,726
2030												1	43.3	118,559
2031													38.1	104,332
2032											30		33.5	91,812
2033											30		29.5	80,795
2034											30		26.0	71,099
2035													22.8	62,567
2036													20.1	55,059
2037													17.7	48,452
2038													15.6	42,638
2039													13.7	37,521
2040													12.1	33,019
2041													10.6	29,057
2042													9.3	25,570
2043													8.2	22,501
2044													7.2	19,801
2045														
2046														
2047														
2048														
2049 (1 mo/yr)	25	4	6	7	1	80	48	28	20	30	180		1000	
2050 notes:														

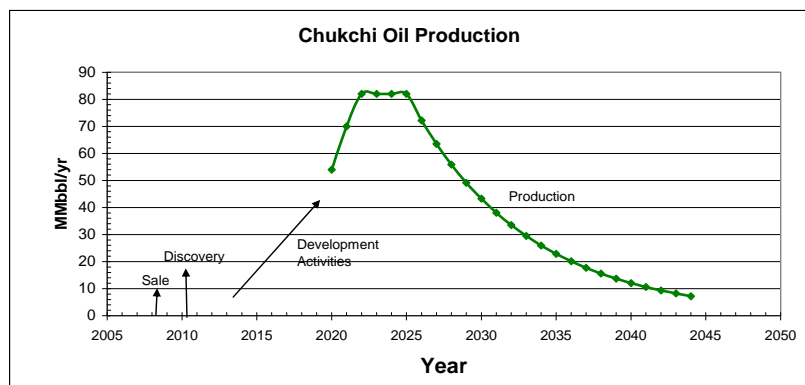


Figure 3. Scenario for possible oil development in the Chukchi OCS.

In addition to the platform, oil production would require supporting infrastructure, including a shorebase, offshore oil pipelines, and an onshore oil pipeline across NPR-A to TAPS. To develop the oil reservoir, the platform would be installed near the center of the field area surrounded by subsea wells. Wells would be drilled from the platform and as subsea wells. On-platform wells would include both oil production and injection wells. Subsea wells (approximately half of the total number of production wells) may be up to 15 mi from the platform. Production from the subsea wells would be gathered to the central platform by small diameter, multi-phase in-field flowlines. The main part of the gas reservoir (“gas cap”) is typically located near the center and (structurally) the highest part of the field because gas is a lighter substance than oil and water.

Raw production from the wells consists of a mixture of oil, gas and water that needs to be separated before transport through pipelines. After separation by processing equipment on the platform, formation water will be treated and injected into the subsurface. After separation and treatment, solution gas would be used as fuel for the facility or injected into the gas cap to maintain reservoir pressure so that more oil can be recovered. We assume that half of the estimated service wells (28 wells, see Figure 2) will inject water and half will inject gas into the gas cap. We also assume that 2 of the 28 service wells will be shallow disposal wells to handle waste water and treated well cuttings from drilling on-platform wells. Offshore facilities, the shorebase, and any necessary facilities along the onshore pipeline route will consume approximately 500 Bcf of gas during 34 years of operations (2020 to 2054) and the remaining gas reserves of 2.25 Tcf will be transported to market (see Figure 2).

IV.B.4. Development, Production, and Transportation of Natural Gas

Five underlying considerations are important to the discussion of a gas development scenario and are bulleted below. These factors suggest that the first commercial gas production will only occur when it can utilize existing oil production facilities because the higher value substance (oil) is needed to support the cost of the new infrastructure. It is, therefore, presumed that natural gas development and production is predicated upon, and would only follow, the oil exploration, development, and production activities analyzed in the 193 FEIS.

Important considerations for gas development:

- **There is no transportation system at the present time to deliver natural gas from Arctic Alaska to market.** The abundant gas resources (proven and undiscovered) in this region will continue to be stranded until a large capacity gas transportation system is operational.
- **A large-diameter, overland gas-sales pipeline system is the most feasible and economically viable project to move large quantities of gas from Arctic Alaska to outside markets.** An important assumption of our gas production scenario is that a future North Slope gas-sales pipeline is built. Several gas-sales pipeline projects have been proposed by industry and strongly supported by federal and state governments, although none have been constructed. At the present time, a new North Slope gas-sales pipeline is not expected to be operational until 2020. At least 10 to 15 years of available gas supplies have been identified close to this future gas-sales pipeline and will likely be produced and fill the gas-sales pipeline before remote gas fields can come online. We do not expect full-scale gas production from the Chukchi OCS or available capacity in the gas-sales pipeline until at least 2030.
- **Other gas transportation strategies (e.g. tankering of liquefied natural gas) have more difficult technical, regulatory, and economic challenges than an overland gas pipeline project.** These strategies were considered, but we found that they are much less likely to occur.

- **The economics of gas development are much less attractive than oil development.** The main disadvantage results from a price discount for gas compared to oil. A steep discount on an energy basis is expected to persist into the future. Despite the low market price for gas, the development costs for new gas fields (platforms, wells, and pipelines) are very similar to oil. This unfavorable cost-price relationship burdens all gas projects.
- **Royalty Suspension Volumes (RSVs) are on a lease basis and are intended to encourage the development of both oil and gas resources.** On leases containing both oil and gas resources the RSVs will likely be depleted by the earlier oil production. On leases containing only gas resources (leases over the gas cap) the RSVs would be available when gas is produced for sale.

Other characteristics of the gas production scenario are:

- Gas production is expected to be delayed until most of the recoverable oil is produced.
- Gas production would briefly overlap declining oil production and last for another 20 years (see Figure 2). Overall, the timeframe for all activities (leasing to abandonment) could span 50 years.
- Gas production would utilize the same oil production platform described in the 193 FEIS scenario.
- No additional exploration seismic surveys would be needed for gas development and production.
- No additional exploration drilling would be conducted for gas production.
- No new development drilling would be needed for gas development and production. Existing oil wells and gas injection wells would be used as gas production wells.
- No in-field flowlines would be needed or constructed.
- Natural gas liquid (condensate) would be separated from the gas stream and transported through the oil pipeline to market. Consequently, the gas pipeline would carry only dry gas (no water or condensates).
- No produced water discharges would occur. Any produced water would be treated and injected into the subsurface through existing disposal wells.
- A gas pipeline from the platform to the shore facilities would be needed. The new pipeline would be constructed during open-water season along same corridor as oil pipeline. Shore facilities are assumed to be near Wainwright.
- The oil production shore facilities would be expanded to accommodate gas processing. Administrative, maintenance, staff, buildings, and capabilities would continue to be used.
- A gas pipeline from the shore facility across NPR-A to the main transportation hub near Prudhoe Bay would be needed. The pipeline across NPR-A would be constructed on risers (vertical support members [VSMs]) during winter along the same corridor as the oil pipeline to TAPS.
- No hydrogen sulfide (H_2S) was recorded in any of the five historic wells drilled in open-hole conditions during 1989-1991: OCS-Y 1482 Klondike #1, OCS-Y 1275 #1 (Popcorn), OCS-Y 1413 #1 (Burger), OCS-Y 1320 #1 (Crackerjack), and Chevron OCS-Y 0996 #1 (Diamond) (Shell Gulf of Mexico Inc., 2009). Based on the absence of H_2S in any previously drilled exploration well in the Chukchi Sea, the Beaufort Sea, or the Canadian Beaufort Sea, H_2S is not expected in any natural gas produced from the Chukchi Sea Planning Area (Shell Gulf of Mexico Inc., 2009).

Aspects of gas development and production that may affect the human environment include: the presence of infrastructure (offshore platform, offshore and onshore pipelines, and shore base); noise and other disturbance from development activities; vessel, air, and ground transportation; emissions and discharges; and accidental events.

A timeframe for development and production is given in Figure 3. The platform would hold one or two drilling rigs, processing equipment, fuel- and production-storage capacity, and quarters for personnel. After the offshore platform is constructed for oil production and later modified for natural gas production, operations will largely involve resupply of materials and personnel, inspection of various systems, and maintenance and repair. Platform operations will transition from oil production to gas production during the last 10 years of oil production. Construction of a new gas pipeline to shore, expansion of the shorebase, and construction of a gas pipeline across NPR-A would occur during this transition period (2030 to 2035). The existing shorebase would be expanded and modified to support gas production. All necessary transportation (marine dock, airport, roads) and support (fuel storage, warehouses, crew quarters, and communication systems) infrastructure will have been constructed previously.

As many as 30 gas production wells are expected to be needed; however, all of these wells can be converted from existing wells from the oil production operations. The injection wells drilled into the gas cap of the reservoir (approximately 14 wells) would be converted to gas production wells. Many of the previously drilled oil wells are expected to produce higher and higher proportions of associated gas. Consequently, no additional well drilling is anticipated for full-scale gas production.

Installation of a subsea gas pipeline from the offshore platform to landfall would occur during summer open-water season. High-resolution seismic surveys and geotechnical studies to locate shallow hazards, obtain engineering data for placement of the pipeline, and to detect archaeological resources and certain types of benthic communities will be conducted along several potential routes. The offshore pipeline would be trenched into the seafloor as a protective measure against damage by floating ice masses. The gas pipeline is expected to be laid along the same corridor as the oil pipeline. The pipelines will be inspected and cleaned regularly by internal devices ("pigs").

An overland gas pipeline across NPR-A along the same corridor as the oil pipeline would transport gas to the main transportation hub near Prudhoe Bay where a gas-sales pipeline is expected to be located. Installation of the overland pipeline would likely be during the winter months when tundra travel is feasible. Like the oil pipeline, the gas pipeline would be elevated. Several compression stations for the gas pipeline will be constructed along the pipeline. These facilities are likely to be co-located with onshore oil and gas fields along the pipeline route.

Offshore development activities would be supported by helicopters and supply vessels. Expansion of the onshore facility and construction of the overland pipeline would be supported by barges, aircraft, and perhaps winter ice roads. Transportation activities would be frequent during these development activities. The level of transportation in and out of the shorebase would drop significantly after development activities are completed. During production operations, there would be 1 to 3 helicopter flights offshore per day, and one vessel trip every 1 to 2 weeks to the production platform. Marine traffic would occur during the open-water season and possibly during periods of broken ice with ice-reinforced vessels.

To avoid potential disturbance effects on birds and marine mammals, BOEM, NMFS, and FWS recommend that aircraft maintain minimum flight altitudes—human safety will take precedence at all times over this recommendation. Information to Lessees No. 2 in the 193 FEIS recommends a minimum flight altitude of 1,500 ft above seal level (ASL) and above ground level (AGL). The 2007 FWS BO specifies that aircraft remain above 1,500 ft over Ledyard Bay Critical Habitat Unit. The FWS' MMPA Incidental Take Regulations require a minimum altitude of 1,500 ft and a horizontal distance of 800 m (1/2 mi) from walrus hauled out on land or ice.

After the gas reserves are depleted, the abandonment phase would begin. Wells would be permanently plugged (with cement) and wellhead equipment removed. Processing modules will be moved off the platform. Pipelines would be decommissioned, which involves cleaning the pipelines, plugging both ends, and leaving them in place buried in the seabed. The overland oil and gas pipelines are likely to be used to develop oil and gas fields in the NPR-A, so they would remain in operation. Finally, the platform will be disassembled and removed and the seafloor site would be restored to a practicable, predevelopment condition. Surveys would be required to confirm that no debris remains and that the drill site and pipelines were abandoned properly. The abandonment process could take several years.

IV.B.5. Potential for Natural Gas Releases

This analysis evaluates the potential for a large gas release during natural gas development and production, as well as the potential impacts of such releases on the environment. This analysis identifies three general types of potential releases: from loss of well control at production platforms, from ruptured pipelines, and from onshore facilities. The following subsections discuss possible ways in which natural gas may be released into the environment, assign probabilities to notable events, and present release scenarios for further environmental resource-specific analysis.

Loss of Well Control

It is possible that a loss of well control during natural gas production could cause a release of natural gas into the environment. The 193 FEIS, Appendix A, discusses the rates for loss of well control during drilling which includes workovers, which is estimated at 2.1×10^{-3} (Izon, Danenberger, and Mayes, 2007). The production well control incident rate for production of both oil and gas is 5.0×10^{-5} blowouts per well year (Holland, 1997). The well control incident rate during production is lower than the development drilling phase. It should be noted that the natural gas development and production scenario analyzed in this SEIS does not entail the drilling of any new wells, but could include workovers.

During sales-gas production, which would commence in 2035, for purposes of analysis it is estimated that one well control incident of a single well on the facility could occur, releasing 10 million cubic feet of natural gas for 1 day. This is based on the average well production for one day from one well and estimated rates of blowout duration for production wells.

Ruptured Pipeline

Although unlikely, there exists some potential for a gas pipeline to rupture. The estimated rate of offshore gas pipeline ruptures in the Gulf of Mexico is 2.4×10^{-5} per mile-year (USDOJ, MMS, 2009). For a 90 mile pipeline, over a 20 year production life, the estimated number of incidents is 0.04 offshore pipeline ruptures over the life of the project. The estimated rate for generic DOT onshore gas transmission lines from 1990-2009 is 1.5×10^{-4} per pipeline mile-year. For a 300 mile onshore pipeline, over a 20 year production life, the estimated number of significant incidents using DOT's estimated rate is 0.9 pipeline over the life of the project. Under DOT regulation, significant incidents are incidents that involve property damage of more than \$50,000, injury, death, release of gas, or that are otherwise considered significant by the operator.

A major release of natural gas would cause a sudden decrease in gas pressure, which in turn would automatically initiate procedures to close the valves on both ends of the ruptured segment of pipeline. Closure of the valves would effectively isolate the rupture and limit the amount of natural gas released into the environment. Given the daily flow rate and the estimated total number of valves, it is estimated that approximately 20 million cubic feet would be released within one pipe section between two valves. Offshore, from a subsea pipeline release, the gas would bubble to the surface and continue into the atmosphere, where it would dissipate. Onshore, from an elevated pipeline, or from an offshore platform, the gas would disperse into the atmosphere.

Onshore Facility

Although unlikely, there exists some potential for a gas leak and explosion at the onshore facility due to the enclosed space. The greatest hazard as a result of a natural gas leak is a fire or explosion. Methane has an auto-ignition temperature of 1,000 degrees Fahrenheit and is flammable at concentrations between 5 to 15 percent in air. Unconfined mixtures of methane in air are not explosive. However, a flammable concentration within an enclosed space in the presence of an ignition source can result in a potential explosion hazard.

Gas Release Fate

Natural gas is primarily made of up methane CH_4 and ethane C_2H_6 which make up 85-90% of the volume of the mixture. Propane, butane and heavier hydrocarbons can be extracted from the gas system and liquefied for transportation and storage. These are commonly known as liquid petroleum gas or LPG. Pentane through decane are the intermediate-weight hydrocarbons and are volatile liquids at atmospheric temperature and pressure. The common names for these are pentanes-plus, condensate, natural gasoline and natural gas liquids. Accidental condensate spills were analyzed in USDOJ, MMS 2007 (Sale 193). Produced gas is expected to be dry gas (no water or condensates).

The primary component of natural gas is methane, a colorless, odorless, and tasteless gas. It is not toxic in the atmosphere, but is classified as a simple asphyxiate, possessing an inhalation hazard. As with all gases, if inhaled in high enough concentration, oxygen deficiency could occur and result in suffocation. The specific gravity of methane is 0.58. Being lighter than air it has the tendency to rise and dissipate into the atmosphere.

Environmental Impacts

The potential environmental impacts of natural gas releases are discussed, as applicable, within resource-specific portions of Section 4.

IV.C. Effects of Natural Gas Development and Production

The natural gas development and production scenario applies to each of the three action alternatives (Alternative I - Proposed Action, Alternative III - Corridor I Deferral, and Alternative IV - Corridor II Deferral). The scenario assumes that the production platform would be constructed near the center of the Sale 193 area, outside of the deferral areas presented in Alternatives III and IV. This location would be available for leasing under each alternative. The hypothetical location of the shore base and the routes of both offshore and onshore pipelines remains constant under the three action alternatives in the scenario. Thus, the minor differences in potential environmental impacts associated with each action alternative are directly traceable to the size and location of deferrals or absence thereof. Under Alternatives 1, 3, and 4, the production platform would be located a minimum distance of approximately 29, 65, and 35 miles from shore, respectively. If the shore base changed location to achieve the shortest possible distance from shore for the platform under each alternative, then the distances would be 12, 60, and 20 miles respectively.

The development and production of natural gas from existing infrastructure would not require any additional exploration activities. The potential effects from exploration activities, including various types of seismic surveying, are fully analyzed in the 193 FEIS. Relevant conclusions of that analysis are also summarized in Chapter 2 of this 193 Draft SEIS. Because no additional exploration activities would occur as a result the natural gas development and production scenario, there is no need to duplicate a full impacts analysis of exploration activities in the 193 Draft SEIS. Further, no additional mitigation measures, beyond those analyzed in the 193 FEIS, have been identified in regard to natural gas development and production activities. Standard mitigation measures and regulations are discussed in this 193 Draft SEIS, as appropriate. A full list of references for the data and major assumptions behind this analysis are available in the 193 FEIS. Many of these references

are retained in the 193 Draft SEIS, in order to contextualize the present discussion. All new information used to support this natural gas analysis is cited accordingly.

Under the No Action alternative (Alternative II), the Secretary would decline to reaffirm Sale 193. No offshore development or production would occur under Sale 193, although such activities could occur within the Chukchi Sea under a future lease sale. Therefore, potential environmental impacts to marine, coastal, and human environment from offshore development and production would not occur or would be delayed. Economic benefits to local communities, the North Slope Borough, the State of Alaska, and the Federal Government would not be realized at this time, due to delay and/or missed opportunities. This alternative would also postpone potential contributions to national energy supplies and security. A variety of adverse and beneficial impacts generally associated with petroleum production could be displaced to other localities, both domestic and foreign. No additional mitigation measures have been identified in this Draft SEIS for the No Action alternative.

Subsequent to the publication of the 193 FEIS, BOEM prepared a draft EIS for the proposed Arctic lease sales remaining in the 2007-2012, 5-Year Program (Sales 209 and 217 in the Beaufort Sea and Sales 212 and 221 in the Chukchi Sea) (USDOJ, MMS, 2008). The Draft Arctic Multiple-Sale EIS was published in November 2008. The Draft Arctic Multiple-Sale EIS used the most recent and best available information to update description of the OCS environment and analyzed resources. The Draft Arctic Multiple-Sale EIS evaluated the potential environmental effects for leasing, exploration, and development and production of both oil and gas resources. The reader is referred to the Draft Arctic Multiple-Sale EIS for a comprehensive update for the Arctic OCS.

Also subsequent to the publication of the 193 FEIS, BOEM reinitiated ESA Section 7 consultation with both the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (FWS). These consultations addressed new information on the occurrence of fin and humpback whales in the Chukchi Sea Planning Area, the newly listed polar bear, the yellow-billed loon as a candidate species, and updated information on ESA listed species, potential effects, and the Arctic environment. In May 2008, BOEM provided an updated Biological Evaluation to NMFS for consultation on bowhead, fin, and humpback whales (USDOJ, MMS, 2008). The NMFS provided their Biological Opinion to BOEM on July 17, 2008 (USDOC, NOAA, NMFS, 2008). In July 2009, BOEM provided an updated Biological Evaluation to FWS for consultation on Steller's eider, spectacled eider, Kittlitz's murrelet, yellow-billed loon, and polar bear. The FWS provided their Biological Opinion to BOEM on September 3, 2009 (USDOJ, FWS, 2009).

IV.C.1. Water Quality

Consistent with regulations (40 CFR 125.122) implementing the Clean Water Act, determining impacts to water quality resulting from marine discharges is made based on consideration of the following ten criteria:

- The quantities, composition, and potential for bioaccumulation or persistence of the pollutants to be discharged.
- The potential transport of such pollutants by biological, physical, or chemical processes.
- The composition and vulnerability of the biological communities that may be exposed to such pollutants, including the presence of unique species or communities of species, the presence of species identified as endangered or threatened pursuant to the Endangered Species Act, or the presence of those species critical to the structure or function of the ecosystem, such as those important for the food chain.
- The importance of the receiving water area to the surrounding biological community, including the presence of spawning sites, nursery/forage areas, migratory pathways, or areas necessary for other functions or critical stages in the lifecycle of an organism.

- The existence of special aquatic sites including, but not limited to, marine sanctuaries and refuges, parks, national and historic monuments, national seashores, wilderness areas, and coral reefs.
- The potential impacts on human health through direct and indirect pathways.
- Existing or potential recreational and commercial fishing, including finfishing and shellfishing.
- Applicable requirements of an approved Coastal Zone Management Plan.
- Marine water quality criteria developed pursuant to Section 304(a)(1).
- Such other factors relating to the effects of the discharge as may be appropriate.

Effects from Natural Gas Development

Relatively little additional development would be needed for natural gas development to proceed from the existing oil production platform. No additional drilling would occur, precluding additional disturbance and greatly reducing the potential for most discharges. Natural gas development activities that may affect water quality in the area include: construction of a gas pipeline from the platform to the onshore facility, expansion of the onshore facility, and construction of a gas pipeline from the onshore facility across the NPR-A.

Degradation of marine water quality could result from installation of the gas pipeline from the platform activities. Sediment resuspension and bottom disturbances are likely to occur as a result of installing and burying the subsea pipeline. The area, duration, and amount of turbidity depend on the grain-size composition of the discharge, the rate and duration of the discharge, the turbulence in the water column, and the current regime. The extent of the area affected could potentially vary under each of the action alternatives in that an increase in the areas deferred from leasing could result in an increase in the length of the platform-to-coast offshore gas pipeline. In the Chukchi Sea Planning Area, the sea bottom within 80 km of shore is mostly sand; farther from shore, the bottom is mostly mud (Lewbel, 1984). Turbidity typically would extend perhaps 3 km from trenching operations. Turbidity would increase over a few square kilometers in the immediate vicinity of dredging operations only during actual dredging. Conditions typically return to ambient conditions within hours to days, depending on the amount, composition, and frequency of the disposed material. Discharges of pollutants and dredge and fill material are regulated under State and Federal permitting processes which require project-specific environmental assessment and documentation.

Effects on water quality from construction activities, including dredging and pipeline installation, would be local and short-term. Effects on local water quality are expected to be low, while the effect on regional water quality is expected to be very low.

Effects from Natural Gas Production

Natural gas production under Sale 193 would cause little to no adverse impacts to marine water quality.

Dry gas is expected to be produced during the gas production phase of the platform. Remaining produced water in the gas stream would be separated, treated, and injected into the subsurface through a disposal well. This would remove produced water as a potential source of water quality degradation.

Three waste-stream discharges during gas production could degrade water quality: deck drainage, sanitary waste, and domestic waste. Deck drainage refers to any waste resulting from platform washing; deck washing; spillage; rainwater; and runoff from curbs, gutters, and drains, including drip pans and wash areas. Pollutants, such as detergents used in platform and equipment washing, oil, grease, workovers fluids, and various other chemicals used during normal operations may be present

in deck drainages. Chemicals may include ethylene glycol, lubricants, fuels, biocides, surfactants, corrosion inhibitors, cleaners, solvents, paint cleaners, bleach, dispersants, coagulants, and any other chemical used in the daily operations of the facility. Deck-drainage discharges are not continuous discharges and vary significantly in volume. Low arctic temperatures prevent high volumes of deck drainage during the long winter months, and precipitation drainage is expected to occur only during the open-water (summer) months. Small quantities (<300 gallons per day) of deck drainage are expected during the gas-production phase of the platform. Higher quantities may occur during periods of high precipitation. Because of the remoteness of the platform and storage limitations, sanitary and domestic wastes are expected to be treated and discharged into marine waters. These discharges would be subject to NPDES permitting and associated water quality-based limitations, as well as associated monitoring requirements. Unreasonable degradation of water quality would be avoided in this manner.

The effect on water quality would be local and would continue for the life of the discharge. The effect on local water quality from gas production is expected to be moderate, while the effect on regional water quality is expected to be very low. Sustained degradation of local and area wide water quality to levels above State and Federal criteria from natural gas is unlikely.

In the event of a natural gas release, methane would be released into the water and proceed to rise through the water column as a function of pressure and temperature. When released in a blowout or rupture at depth, the quality of the water would be altered temporarily and in deeper, colder waters some of the natural gas enters the water as a water-soluble fraction. Upon reaching the surface the gaseous methane would react with air, forming carbon dioxide (CO²) and water which would then disperse into the atmosphere. The near-surface water quality would have higher concentrations of CO² than is natural and could therefore affect processes and reactions at the water-air interface. Depending on the size of the event, the effects on water quality would be temporary to short-term and would be negligible to minor in quality.

Conclusions

Neither natural gas development nor production is expected to cause significant adverse impacts to water quality. Temporary and localized adverse effects are likely to result from installation of a new offshore natural gas pipeline and from small scale and infrequent deck drainage discharges. The effect of these activities on regional water quality would remain very low.

IV.C.2. Air Quality

The type and relative amounts of air pollutants generated by offshore operations vary according to the phase of activity. There are three principal phases of OCS operations: exploration, development, and production. No exploration activities associated with the gas production are expected. Impacts to air quality would result from the discharge of air pollutants from industrial equipment associated with natural gas support, development, and production activities.

Effects from Natural Gas Development

Emissions from development would result from the construction of an offshore pipeline, expansion of onshore support facilities, and construction of up to 300 mi of onshore pipeline across NPR-A. The main sources of emissions would include:

- heavy construction equipment used to install the platform-to-shore pipeline;
- construction and support equipment, including cranes, generators, compressors, welders, heaters, and safety flares; and
- tugboats (needed to move equipment and supply barges), support vessels, and helicopters.

The main emissions would be nitrous oxides (NO_x) and carbon monoxide (CO), with lesser amounts of sulfur dioxide (SO₂), volatile organic compounds (VOC), and particulate matter (PM). The best available control technology (BACT) is expected to be used and would be required if emissions for the project were determined to exceed PSD Class II limits under USEPA or ADEC air quality regulations.

Effects from Natural Gas Production

The types of emissions sources and their emission rates would not be significantly different from those associated with oil production alone. The main sources of emissions during gas production would include:

- production equipment, including generators, turbines, pumps, gas compression equipment, boilers, heaters, and storage tanks;
- gas processing at the onshore facility; and
- support activities, including vessel and aircraft traffic.

The main source of offshore emissions during the production phase would be from turbines used for power generation, gas compression, oil pumping, and water injection. Other sources of emissions would be evaporative losses of VOCs from tanks, pumps, compressor seals, and valves. Reductions in VOC emissions are expected as a result of equipping tanks and valves with seals designed to prevent VOC leakage. VOCs would also be emitted if there were an accidental release of gas (venting). Operators would be required to have a safety flare to safely burn any unexpected releases of natural gas. Flaring gas would be done for safety purposes; but it also would eliminate most of the VOCs, although some emissions of NO_x, carbon dioxide, SO₂, and PM would be released.

A significant increase in O₃ concentrations onshore is not likely to result from offshore development or production. Photochemical pollutants such as ozone are not emitted directly; they form in the air from the interaction of other pollutants in the presence of sunshine and heat. Although sunshine is present in the Chukchi Sea Planning Area most of each day during summer, temperatures remain relatively low (Brower et al., 1988). Air-monitoring sites in the Prudhoe Bay and Kuparuk areas show that the highest 1-hour-maximum O₃ concentrations generally are in the range of 0.05-0.07 parts per million (ppm), which is well within the National and State of Alaska 8-hour average O₃ standard of 0.08 ppm. Because the O₃ precursor emissions from development and production of a single gas field in the Chukchi Sea are expected to be considerably lower than the existing emissions from the Prudhoe Bay/Kuparuk/Endicott complex, the gas development and production should not cause any O₃ concentrations to exceed the 8-hour Federal standard.

In the 2008, Beaufort Sea and Chukchi Sea Planning Areas Oil and Gas Lease Sales 209, 212, 217, and 221 Draft EIS (Arctic Multi-Sale DEIS), estimates were made of the total emissions of carbon dioxide (CO₂) and methane (CH₄) from projected oil and gas activities associated with the proposed Chukchi Sea lease sales (Sales 212 and 221) (USDOJ, MMS, 2008). Table 1 lists the total calculated emissions of CO₂ and CH₄ for the peak period of activity associated with a Chukchi Sea lease sale, as analyzed in the Arctic Multi-Sale DEIS, and compares them with the total U.S. greenhouse gas emissions for the year 2005. Emissions factors for the various activities were largely based on a comprehensive inventory of air emissions from OCS activities in the Gulf of Mexico for the year 2000 (Wilson, Fanjoy, and Billings, 2004).

The estimated global CO₂ emission rate from combustion of fossil fuels for 2005 is approximately 28,193 Tg (EPA, 2008c). The U.S. contribution to this total is about 20% (EPA, 2008c). The estimated CO₂ emissions from both oil and gas activities resulting from a Chukchi Sea Lease sale are 0.006-0.008% of 2005 CO₂ emissions in the U.S. The estimated CH₄ emissions from a Chukchi Sea lease sale are 0.0001-0.0004% of 2005 CH₄ emissions in the U.S. Natural gas development and

production from Sale 193 would represent less than half (< 50%) of the estimated CO₂ and CH₄ emissions associated with a Chukchi Sea lease sale.

Table 1. Projected greenhouse gas emissions from a proposed Chukchi Sea Lease Sale

Greenhouse Gas	Million Metric Tons CO₂ Equivalent	Total 2005 U.S. Emissions, Million Metric Tons CO₂ Equivalent	Emission from Chukchi Sale as Percentage of Total U.S. Emissions
CO ₂	0.341 - 0.482	6,089	0.006 - 0.008
CH ₄	0.0006 - 0.0020	539	0.0001 - 0.0004
CO ₂ + CH ₄	0.342 - 0.484	6,628	0.005 - 0.007

Visibility may be defined in terms of visual range and the contrast between plume and background, which determines perceptibility of the plume. For their proposed Liberty Project, BPXA ran the VISCREEN model, which calculates the potential impact of a plume of specified emissions for specific transport and dispersion conditions. It found noticeable effects on a limited number of days, those that had the most restrictive meteorological conditions, but no effects at all during average meteorological conditions. We expect that those results would be representative of gas development in the Chukchi Sea Planning Area.

The effects of emissions from production activities are expected to cause small, local, and temporary increases in the concentrations of criteria pollutants. Consequently, we consider the effect of gas production on air quality to be low.

Conclusions

Minor adverse impacts to air quality would occur from the emissions of machines and generators generally associated with development and production activities. However, any increase in concentrations of criteria pollutants from these activities would be small, local, and temporary. Overall effects would be low and would not exceed any Clean Air Act standards. Natural gas development and production would result in a negligible contribution to U.S. and global greenhouse gas emissions. The location of such impact could potentially vary under each action alternative. The deferral areas incorporated into Alternatives III and IV would further distance certain air quality impacts (such as emissions from the platform) from the coastline and human populations. It is also possible that support vessels and aircraft would be forced to travel greater distance, leading to overall greater emissions.

IV.C.3. Lower Trophic-level Organisms

Several aspects of the new natural gas production scenario could potentially impact lower trophic-level organisms, specifically installation of a new platform-to-shore pipeline and extended operation of the platform and associated infrastructure. Localized and temporary adverse impacts can be expected from these activities. Minimal impacts to lower trophic-level organisms are expected from the expansion of the onshore facility, installation of a gas pipeline across the NPR-A, or other components of the natural gas development and production scenario.

Effects from Natural Gas Development

Natural gas development and production would be predicated on the existence of oil development and production infrastructure. The oil scenario analyzed in the FEIS envisions a single production platform with a footprint of several acres. Relatively little additional development would be needed for natural gas production to proceed. Most of these new activities, such as recompletion of wells, expansion of the topside facility, associated vessel and aircraft traffic, expansion of the shore base, and installation of a onshore pipeline across NPR-A would have minimal impacts on lower trophic-level organisms.

The installation of an offshore pipeline to connect the platform with the onshore facility, however, would adversely impact lower trophic-level resources. This new offshore gas pipeline would be buried about 12 feet deep – deep enough to minimize the potential for disruption from ice keels. The pipeline, approximately 70 feet wide, would run parallel to the existing offshore oil pipeline over an estimated distance of 30-150 miles, disturbing roughly 1,000-2,000 acres of typical benthic organisms. Some of this area will have already been disturbed during installation of the offshore oil pipeline. The extent of the area affected could potentially vary under each of the action alternatives in that an increase in the areas deferred from leasing could result in an increase in the length of the platform-to-coast offshore gas pipeline.

This action would disturb a seafloor that is currently inhabited by mollusks (clams) and other fauna that are particularly abundant in the northern and northeastern parts of the proposed lease area (Feder et al., 1994:Fig. 4b). The recovery time for benthic communities is indicated by a study of ice gouges. Conlan and Kvitek (2005) studied the recolonization of ice gouges in relatively shallow water (12–28 m) in the Canadian high Arctic. They found that new scours were recolonized quickly by some animals, such as polychaetes, but predicted recolonization of the original community would require many years. Two ice scours studied for 8 or 9 years achieved only 65–84% recolonization of the original community within that time. The fastest recolonization rate (65% in 8 years) might be appropriate for the slightly deeper but warmer northeastern Chukchi Sea. The large clams on which walrus usually feed (Sec. IV.C.1.h(3)) are probably some of the last organisms to recolonize disturbed areas. Previous studies had shown that when kelp was removed experimentally from boulders in the Beaufort Sea, only 50% of the denuded area was recolonized within 3 years. The study concluded that grazing by invertebrates might be a reason for the limited recolonization. Recently, recolonization rates were measured for kelp within cages that excluded invertebrates (Konar, 2007). However, even within the cages, there was no recruitment within 2 years, demonstrating again that kelp recovers very slowly from disturbance. Therefore, this assessment assumes that the recovery time would require slightly more than a decade. The disruption of 1,000 to 2,000 acres of benthic organisms that would take around a decade to recover is considered a major level of effect. Any overlap between the new offshore gas pipeline corridor and the existing offshore oil pipeline corridor would minimize the distribution of adverse impacts.

The anchoring of vessels supporting various gas development activities will cause some continuing bottom disturbance. These adverse impacts are expected to be small-scale and temporary, and therefore minor.

Effects from Natural Gas Production

Natural gas production under Chukchi Sea Lease Sale 193 would cause little to no adverse impacts to lower trophic-level organisms. No additional drilling would occur, precluding additional disturbance and greatly reducing the potential for most discharges. It is expected that any gas produced under Sale 193 would be dry gas. If present, any produced water will be of minimal quantity. Any remaining produced water in the gas stream would be separated, treated, and injected into the subsurface through a disposal well. This would remove produced water as a potential source of water quality degradation.

Regarding the potential for large releases of natural gas, of primary concerns to benthic environments in such events are the pressure of the outflow, makeup of the gas concentrates and percentages of gas solids, mud or sediment components, and physical factors causing dispersal of ejected materials in the immediate affected environments (Solheim and Elverhoi, 1993). Pressure of gas deposit will determine both the amount of methane escaping from the site and the force at which it will be ejected from the sub-benthic surface. In turn, the amount of force combined with percentage of mud, silt, or sand will directly affect the plume ejected from the blowout site and the capacity of the resulting discharge to be deposited in the areas adjacent to the blowout site (Rye, Brandvic, and Strom, 1997).

Plumes with higher density, or higher sand content, will be deposited at lesser distances from the blowout site relative to high percentages of silt or mud, which would be suspended in the water column and deposited further from the well site (Johnansen, 2000). Physical factors, such as current direction and speed, wind speed and direction, presence or absence of ice cover, will influence the deposition on nearby benthic environments (Birtwell and McAllister, 2002). Deposition of ejected substrate material onto nearby benthic resources could extirpate or otherwise severely affect the capacity of localized resources to support benthic and epibenthic invertebrate and vertebrate populations, including essential fish habitats, for one or more years. Recovery would occur in less than three generations, and overall impacts would be considered minimal and not significant.

Conclusions

Several components of the natural gas development scenario, such as installing an offshore gas pipeline and anchoring vessels, have the potential to impact lower trophic-level organisms. However, these impacts would be localized and temporary, given the strong expectation of recolonization. As a result, no adverse long-term impacts to lower trophic level organisms are expected to result from natural gas production. Overall no significant adverse effects to this resource would occur.

IV.C.4. Fish Resources

Activities which directly impact habitat or produce high levels of noise or pollution can measurably affect fish populations. Relevant impacts can include short- and long-term displacement from work areas due to emitted underwater sounds and sediment plumes, short-term losses of seafloor habitats, and multiyear injury/mortality in a “zone-of-influence” near sources of pollution. While some fish could be harmed or killed under the above conditions, most in the immediate area would avoid these activities.

The following activities associated with the natural gas development and production scenario have the potential to affect fish: trenching seafloor to place a gas pipeline from platform to shore; regulated or unregulated discharges from platform; vessel noise; platform operating noise; and pipeline construction across NPR-A. These activities would overlap marine and freshwater salmon EFH (adult, juvenile, eggs) and Arctic cod marine EFH (adult, juvenile) in areas. The potential effects would include: physical disturbance of fish habitat; alterations in quality of water in which fish occur; disturbance, startle or displacement from noise; exposure of sedentary fish to discharges and repetitive noise. Some of these negative effects would be temporary and negligible; other negative effects (such as benthic habitat trenching and disturbance to spawning behavior or habitat) would have longer-term effects.

Effects from Natural Gas Development

Relatively little additional development would be required to transition from oil production activities to natural gas production activities. There are some components of the natural gas development scenario, however, that could affect fish resources by disturbing portions of the Chukchi seafloor or by producing relatively high levels of noise.

Seafloor Disturbance

One activity that would cause direct disturbance of the seafloor is vessel anchoring, which may be necessary to support the development (and production) of natural gas. Anchoring could cause both direct and indirect impacts to fish resources. Direct impacts could occur if fish are crushed or injured during anchoring or weighing anchor. Indirect impacts to fish resources may occur should an anchor damage sessile organisms (e.g., kelp) or their habitats (e.g., boulders). Such damage is possible under certain conditions when anchors fail to hold fast and drag across the seafloor. Anchoring in fragile areas (e.g., kelp beds) likely would yield more damage to fish resources and habitat than anchoring offshore in sand or mud. There are a few kelp beds in the Chukchi Sea, but they are located nearshore

or in coastal lagoons, unlikely sites for a vessel to anchor unless necessary for safety. The magnitude of any damage to the seafloor would depend chiefly on exactly where anchors were placed, whether an anchor drags, and what an anchor might drag across. Direct impacts to benthic fish habitats would be restricted to the anchoring site, and these limited areas would be very small compared to the total area of benthic habitat available. These negative impacts are considered negligible.

The installation of new gas pipelines could also cause direct and indirect impacts to fish resources. The offshore gas pipeline would extend shoreward from the production platform for a distance of between 30-150 miles. Trenching would be necessary to protect against damage by ice in all water depths under 165 ft (50 m). Both trenching and actual pipelaying would take place during the short open-water season or during mid- to late winter, when landfast ice has stabilized. In addition to disturbing a long corridor of seafloor, trenching would temporarily increase turbidity around the project footprint. Depending on the nature of the substrate, this turbidity could either remain for short-amounts of time or be moved offsite into other areas. At a coastal landfall, the pipeline likely would be elevated on a short gravel causeway to protect it against shoreline erosion. Overall, installation of the new offshore gas pipeline would cause direct and indirect impacts similar to vessel anchoring, but would do so on a much larger scale. Though adverse impacts would be expected, they would remain temporary and localized. The extent of the area affected could potentially vary under each of the action alternatives in that an increase in the areas deferred from leasing could result in an increase in the length of the platform-to-coast offshore gas pipeline.

The potential for adverse impacts would be minimized through the applicable regulatory processes implemented by BOEM and other Federal agencies. Pipeline permit applications to BOEM include the pipeline location drawing, profile drawing, and other relevant information. The BOEM evaluates the design and fabrication of the pipeline and prepares an additional NEPA analysis. All pipeline right-of ways that go ashore require an EA if not an EIS. The NMFS and FWS also review and provide comments on applications for pipelines that are near certain sensitive biological communities. The BOEM will not approve a proposed pipeline route if any bottom disturbing activities (from the pipeline itself or from the anchors of lay barges and support vessels) encroach on any biologically sensitive areas.

The onshore gas pipeline across NPR-A also has the potential to adversely impacts fish resources. However, with the onshore gas pipeline there exist many more opportunities to proactively avoid or at least minimize potential adverse impacts. Installation of the long overland gas pipeline across NPR-A would likely occur in the winter months when tundra travel is feasible. The pipeline itself would be elevated on vertical supports and utilize the same corridor as the overland oil pipeline, which would already be in place. Appropriate avoidance and mitigation measures would be expected to result from the robust regulatory processes that apply to such projects. Post-landfall pipeline and associated maintenance-road alignment would depend on a number of factors, including cost and distance and avoidance of wetlands and other sensitive habitats as dictated by Federal policy and law. These policies would guide mitigation efforts to reduce direct construction impacts to fish-bearing streams and lakes such as clear-span crossings, setbacks, and sediment- and erosion-control measures. Future facility locations would be evaluated on a site-specific basis to avoid or minimize adverse construction-related impacts to fish habitats that could be affected by the proposed sale. These construction activities are anticipated to result in temporary and/or localized adverse impacts to fish and fish habitats, but recovery would be expected to occur in fewer than three generations.

Noise

Marine organisms have evolved a plethora of ways to sense their environment and use these senses to provide information that allows them to communicate and to find their way. Most relevant to this discussion, fish can detect sounds (Popper et al., 2003) and changes in water-current (Coombs and Braun, 2003). Loud noises or intense changes in water pressure can elicit a startle response and

disrupt fish behavior on individual and group levels. Although no additional seismic activities or well drilling would occur, two components of the natural gas development and production scenario would produce enough noise to potentially affect fish: vessel traffic and pipeline installation.

Engine-powered vessels may radiate considerable levels of noise underwater. Diesel engines, generators, and propulsion motors contribute significantly to the low frequency spectrum. Much of the necessary machinery to drive and operate a ship produces vibration, within the frequency range of 10 Hz-1.5 kiloHertz, with the consequence of radiation in the form of pressure waves from the hull (Mitson and Knudsen, 2003). In addition to broadband propeller noise, there is a phenomenon known as “singing,” where a discrete tone is produced by the propeller, usually due to physical excitation of the trailing edges of the blades. This can result in very high tone levels within the frequency range of fish hearing. The overall noise of a vessel may emanate from many machinery sources. Pumps in particular often are significant producers of noise from vibration and, at higher frequencies, from turbulent flow. Sharp angles and high flow rates in pipework also can cause cavitation, and even small items of machinery might produce quite high levels of noise. Some, but not all relevant studies have noted avoidance behavior by fish subjected to loud noises from a vessel. Data also suggests that abnormal fish activity may continue for some time as the vessel travels away. However, vessel noise is inherently transient, rendering adverse impacts temporary. Fishes in the immediate vicinity of vessels may also exercise avoidance. In light of the above, vessel noise is likely to be of negligible impact to fish resources.

Noise-related disturbance effects on fish and direct loss or degradation of fish habitats are likely occur during construction in the marine environment. The new offshore gas pipeline is no exception to this general rule. Potential pipeline locations would be evaluated on a site-specific basis to avoid or minimize adverse construction-related impacts to fish habitats. The installation of the new pipeline would be anticipated to result in temporary and/or localized adverse impacts to fish and fish habitats. The minimum potential length of both the offshore gas pipeline as well as support vessel travel routes could vary under each action alternative given the fact that two alternatives include deferral areas of varying size.

Effects from Natural Gas Production

Noise

The production platform would require continued servicing from vessels which, as discussed above, produce noise when in transit. Vessel activity would be less frequent and be generally restricted to an area between the drill site and a land-based support site. Additional noise may occur through other aspects of gas production. All of these noise impacts, however, would have a negligible effect on fish resources.

Pollution

Although salmon and other fish species have exhibited sensitivity to polycyclic aromatic hydrocarbons (PAH) and pollutants associated with industrial activities, applicable regulations place strict standards on all production activities, and nothing within the natural gas production scenario analyzed here exhibits real potential to measurably impact fish resources through pollution.

Release of Natural Gas

Although most natural gas eventually rises to the surface of the water, some enters the water as a water-soluble fraction which can include hydrocarbon mixtures that trigger behavioral and physiologic responses in adult and juvenile fish and present toxicity exposure to adult and juvenile fish, eggs and larvae. Depending on the size of the event, the toxicity effects would be negligible to minor on fish populations in the region. Fish life stages would also be exposed to physical aspects of a gas blowout or rupture at depth through: sound produced by the explosion and release; pressure

waves caused by the release; and bubble release, travel and collapse. Behavioral, physiological or physical effects could occur as a result of adults, juveniles, larvae and eggs being exposed to these physical effects of a natural gas blow-out or rupture. Depending on the size of the event, the physical effects would be negligible to minor on fish populations in the region.

Conclusions

Several types of direct and indirect impacts would occur as a result of the natural gas development and production scenario. Direct impacts, however, would be minimized by the ability of many fish to avoid disturbance and flee from areas of high noise. Indirect impacts would occur to seafloor habitat from pipeline installation and anchoring. These effects cannot be avoided, but would likewise remain localized, temporary, and minor. Consequently, no significant adverse effects would occur.

IV.C.5. Essential Fish Habitat

The following activities associated with the natural gas production and development scenario have the potential to affect essential fish habitat: trenching seafloor to place a gas pipeline from platform to shore; regulated or unregulated discharges from platforms; vessel noise; platform operating noise; and pipeline construction across NPR-A. These activities would overlap marine and freshwater salmon EFH (adult, juvenile, eggs) and arctic cod marine EFH (adult, juvenile) in areas. It is also possible that certain activities could affect opilio crab EFH and saffron cod EFH, both of which are located in relatively close proximity to the lease sale area. The potential effects would include: physical disturbance of fish habitat; alterations in quality of water in which fish occur; disturbance, startle or displacement from noise; exposure of sedentary fish to discharges and repetitive noise. Some of these effects would be temporary and negligible; other effects (such as benthic habitat trenching and disturbance to freshwater spawning areas) would have longer-term effects on habitat.

Effects from Natural Gas Development

Trenching and the installation of new gas pipelines is the only component of the natural gas development scenario with the potential to affect Essential Fish Habitat. Two separate pipelines would be built under this scenario. An offshore gas pipeline would extend shoreward from the production platform for a distance of between 30-150 mi. Trenching would be necessary to protect against damage by ice in all water depths less than 165 ft (50 m). Both trenching and actual pipelaying would take place during the short open-water season or during mid- to late winter, when landfast ice has stabilized. In addition to disturbing a long corridor of seafloor, trenching would temporarily increase turbidity around the project footprint. Depending on the nature of the substrate, this turbidity could either remain for short-amounts of time or be moved offsite into other areas. At a coastal landfall, the pipeline likely would be elevated on a short gravel causeway to protect it against shoreline erosion. Overall, installation of the new offshore gas pipeline would cause direct and indirect impacts similar to vessel anchoring, but would do so on a much larger scale. Though adverse impacts to marine salmon as well as arctic and saffron cod would be expected, they would remain temporary and localized.

The potential for adverse impacts would be minimized through the applicable regulatory processes implemented by BOEM and other Federal agencies. Pipeline permit applications include the pipeline location drawing, profile drawing, and other relevant information. The BOEM evaluates the design and fabrication of the pipeline and prepares an additional NEPA analysis. All pipeline right-of ways that go ashore require an EA if not an EIS. The FWS also reviews and provides comments on applications for pipelines that are near certain sensitive biological communities. Lease Stipulation No 1 – Protection of Biological Resources, which requires lessees to survey for as well make every reasonable effort to preserve and avoid areas of biological significance, would further mitigate against potential adverse impacts to EFH.

An onshore gas pipeline across NPR-A would also be necessary, and it too would have the potential to adversely impact Essential Fish Habitat. The onshore pipeline has comparatively less potential to affect these resources given the relative scarcity of designated EFH within the likely pipeline corridor, as well as the relative abundance of opportunities to proactively avoid or at least minimize potential adverse impacts onshore. Installation of the long overland gas pipeline across NPR-A would likely be in the winter months when tundra travel is feasible. The pipeline itself would be elevated on vertical supports and utilize the same corridor as the overland oil pipeline, which would already be in place. Appropriate avoidance and mitigation measures would be expected to result from the robust regulatory processes that apply to such projects. Post-landfall pipeline and associated maintenance-road alignment would depend on a number of factors, including cost and distance and avoidance of wetlands and other sensitive bird and wildlife habitats as dictated by Federal policy and law. These policies would guide mitigation efforts to reduce direct construction impacts to fish-bearing streams and lakes such as clear-span crossings, setbacks, and sediment- and erosion-control measures. Future facility locations would be evaluated on a site-specific basis to avoid or minimize adverse construction-related impacts to fish habitats that could be affected by the proposed sale. These construction activities are anticipated to result in temporary and/or localized adverse impacts to fish and fish habitats, but recovery would be expected to occur in fewer than three generations.

Effects from Natural Gas Production

Little additional impact to Essential Fish Habitat is expected to result from continued production activities. Minor and temporary noise impacts from vessel traffic could affect each species' EFH, including the opilio crab. In the event of a large-scale natural gas release, the chemical and physical water column environment of arctic cod Essential Fish Habitat would be affected temporary to short-term and at a negligible to minor level.

Conclusions

Installation of natural gas pipelines is the only development activity associated with the natural gas development and production scenario that has the potential to cause more than negligible impacts to EFH. The onshore pipeline is expected to avoid any serious adverse impacts (such as obstructing streams or disturbing spawning areas) by virtue of its raised design and later site-specific review. The offshore pipeline would cause notable, but very localized impacts within a relatively narrow corridor. Both the onshore and offshore pipelines would be subject to rigorous additional regulatory review. In terms of natural gas production activities, adverse impacts to Essential Fish Habitat would only be anticipated in the event of a large-scale natural gas release. Overall, adverse impacts to EFH from natural gas development and production would be temporary and localized, and would not rise to the level of significance.

IV.C.6. Whales –Threatened and Endangered

The aspect of natural gas development and production posing the greatest risk of impacts to whales is noise. Generally speaking, noise impacts on cetaceans can range from annoyance to behavioral change to physical harm such as hearing loss, the latter of which can result (in serious cases) in an inability to communicate, detect, and/or echolocate. Sometimes even relatively low levels of noise not directly harmful to a whale itself can “mask” naturally-occurring noises upon which whales rely in order to perform basic functions such as communication, echolocation, and feeding. Noise impacts to cetaceans are largely dependent on the specifics of a given situation: i.e. the species affected; the age, sex and reproductive status; the accumulated hearing damage of an individual; and/or the size of the group of whales affected. Assessment of impacts can also be problematic, as negatively impacted whales may continue certain behavior (e.g. feeding or migration) out of necessity.

Of primary concern here is whether natural gas development and production activities could produce noise and disturbance sufficient to cause bowhead, fin, or humpback whales to avoid high value

areas, thereby risking biological consequences. The analysis below focuses on the potential effects to bowhead whales from natural gas development and production in the Chukchi Sea OCS. Fin and humpback whales are expected to react to natural gas development and production activities similarly to bowhead whales. Fin and humpback whales effects would be limited to a few individuals because of the low numbers of these species that occur in the Chukchi Sea Planning Area. Impacts to each of these species could vary under each action alternative given the respective minimum distance from shore at which the platform could be constructed.

Effects from Natural Gas Development

Activities associated with the development of natural gas that could cause adverse impacts to Threatened and Endangered whales are the transit of marine vessels and aircraft, installation of an offshore gas pipeline, and to a lesser extent, recompletion of existing wells and expansion of the topside facility and the shore base.

Potential Effects from Vessel Traffic

Gas development activities would lead to a temporary increase in vessel traffic to service the platform existing and support the installation of new offshore gas pipeline. Some marine vessels including sealift and other barges and boats (but not including icebreakers) would be used in natural gas development activities. It is conceivable that cetaceans could be disturbed or struck by these vessels. As noted in discussion of the affected environment, baseline information indicates that current rates of vessel strikes of bowheads are low. At present, available data do not suggest that strikes of bowheads by oil and gas-related vessels will become an important source of injury or mortality.

The greater issue is noise. Bowheads react to the approach of vessels at greater distances than they react to most other industrial activities. According to Richardson and Malme (1993), most bowheads begin to swim rapidly away when vessels approach rapidly and directly. This avoidance may be related to the historic commercial and continuing subsistence hunting. Avoidance usually begins when a rapidly approaching vessel is 1-4 km (0.62-2.5 mi) away. A few whales may react at distances from 5-7 km (3-4 mi), and a few whales may not react until the vessel is <1 km (<0.62 mi) away. Received noise levels as low as 84 dB re 1 μ Pa) or 6 dB above ambient may elicit strong avoidance of an approaching vessel at a distance of 4 km (2.5 mi) (Richardson and Malme, 1993). Vessel disturbance has been known to disrupt activities and social groups. Fleeing from a vessel generally stopped within minutes after the vessel passed, but scattering may persist for a longer period.

Where vessels approach slowly or indirectly, bowheads are much more tolerant, and reactions are generally less dramatic. The encounter rate of bowhead, humpback and fin whales with vessels associated with natural gas development would depend on the location of the platform in relation to both shipping routes and areas of heavy use. During their spring migration (April through June), bowheads likely would encounter few, if any, vessels along their migration route, because ice at this time of year typically would be too thick for supply vessels to operate in. Bowheads, humpback and fin whales probably would adjust their individual swimming paths to avoid approaching within several kilometers of vessels attending the production platform and would move away from vessels that approached within a few kilometers.

Potential Effects from Aircraft Traffic

Gas development activities involve small and temporary increases in air traffic within the action area, including use of fixed-wing aircraft in support of the installation of the new offshore gas pipeline. These aircraft would be serving as whale spotters. There does exist some potential for noise from a spotter aircraft to elicit a response, such as a turn or hasty dive, from a whale or group of whales. But given the height at which these aircraft would fly, the potential for adverse reactions is small. Any impacts that did occur would be temporary and minor. Overall, the use of spotter aircraft is an important mitigation technique that would reduce the overall potential for gas development to cause

adverse impacts to whales. Helicopters could also be used to transport crews and supplies in support of gas development. Impacts to whales from helicopters would be similar to those from airplanes: temporary and minor. Under Alternatives III and IV, travel routes to the platform could be longer.

Potential Effects from Construction Activities

Natural gas development would entail a variety of construction-type activities, to include expansion and maintenance of the topside facility and the onshore base, and most notably, installation of an offshore gas pipeline. These activities can impact Threatened and Endangered marine mammals in that they are relatively noisy. Both expansion projects would produce noise from stationary locations, and could thus be largely avoided by baleen whales. Despite the long, linear nature of pipelines, their construction is a slow-moving, relatively stationary operation. Thus, pipeline construction represents a similarly temporary and avoidable source of disturbance. To avoid or minimize adverse impacts, relevant organizations (i.e., project proponents, BOEM, NMFS) will need to develop timing guidelines and operational protocols to govern the specifics of this project. This review would take place at a later stage of review, when more site-specific information would be known.

Potential Effects from Abandonment

Some adverse impacts to whales may also occur during abandonment of natural gas production wells and the offshore gas pipeline. Abandonment operations include plugging and abandoning wells, decommissioning subsea pipelines, and removal of production equipment and platforms. Established procedures and regulations govern all these operations. Pipelines are flushed/cleaned and then usually left in place buried below the seafloor surface. Production equipment would be partly disassembled and then moved off the platform during the summer open-water season. These activities are not expected to cause impacts to whales, apart from the possibility of vessel noise impacts as analyzed above.

Abandonment of wells, meanwhile, involves a very slight potential for more serious adverse impacts. During abandonment, wells usually are permanently plugged with cement after the wellhead equipment is removed. The casings for delineation wells usually are cut mechanically or with small explosive charges. The use of explosives could result in injury or even death to threatened and endangered marine mammals in the area at the time of the explosions. Monitoring (e.g., aerial surveys and passive acoustic monitoring) for whales prior to the use of explosives would reduce the potential for adverse impacts. Overall, impacts from abandonment are expected to be low.

Effects from Natural Gas Production

Potential Effects from Disturbance

During natural gas production, operation and maintenance of the platform and related infrastructure could potentially affect ESA-protected cetaceans by introducing additional noise into local waters. Given the relatively low noise levels associated with normal production activities, and the fact that whales appear to exhibit less avoidance behavior with stationary sources of relatively constant noise than with moving sound sources, any such impacts would be temporary, avoidable, and minor.

To ensure that crews are rotated and certain supplies delivered, gas production activities on the platform would continue air support. This air support would consist of turbine helicopters flying along straight lines, making roughly one to three trips per day. Most bowheads are unlikely to react significantly to occasional single passes by low-flying helicopters ferrying personnel and equipment to offshore operations. Observations of bowhead whales exposed to helicopter overflights indicate that most bowheads exhibited no obvious response to helicopter overflights at altitudes above 150 m (500 ft). Other studies confirm that peak sound levels received underwater diminished with increasing aircraft altitude. At altitudes below 150 m (500 ft), some bowheads probably would dive quickly in response to the aircraft noise (Richardson and Malme, 1993). However, bowhead reactions to a single

helicopter flying overhead probably are temporary (Richardson et al., 1995a). This noise generally is audible for only a brief time (tens of seconds) if the aircraft remains on a direct course, and the whales should resume their normal activities within minutes. Mitigation measures (whether implemented via BOEM policy, NMFS Incidental Take Rules (ITRs), Section 7, ESA consultations, or other sources) which prescribe minimal altitudes for aircraft transiting through the action area will serve to further reduce potential impacts.

Potential Effects from a Natural Gas Release

The scenario for gas production entails the conversion of existing oil wells on production platforms to gas/gas condensate wells after oil recovery has been ongoing and there would be a period of years where oil and gas production would overlap. Accidental spills of condensates and oil were analyzed in USDA, MMS 2007 (Sale 193). Released gas would be expected to be dry gas with no condensates or water. There would be no effects to cetaceans from an onshore gas facility, including pipelines.

there would be no effects to cetaceans from an onshore gas facility, including pipelines. Effects from atmospheric release of natural gas from production platform facilities would have no effect on cetaceans unless explosion or fire result. Rapid dissipation of the lighter than air components of gas into the atmosphere and the localized short term nature of a release minimize the time of exposure and potential inhalation of fumes by cetaceans and effects would be considered minor to negligible.

In such cases the visible presence of fire and smoke plumes, emergency activities to control the event and the noise from an explosion would have potential temporary effects. Cetaceans, including bowhead, fin and humpback whales normally avoid noise and human activity similar to those occurring during control activities and operational noise from platforms. Noise from an explosion would be a single instant event and non lethal to cetaceans.

Potential effects could occur in the event that a gas release occurred via an accident involving the ocean bottom well control device failure or undersea gas transport pipeline releases resulting from corrosion, breaks or other factor. Undersea pipeline releases would be short term (up to one day) and limited to the volume of gas/condensate present between pressure sensitive control valves that close when pressure is lost (up to 10 million cubic feet of gas) and depending upon the pipe diameter and distance between control valves. Releases would be localized to the immediate area of the release. Methane and ethane natural gas components-would likely bubble to the surface and dissipate in the atmosphere at the shallow depth occurring in the Chukchi Sea. Toxic effects upon baleen whale prey items would be negligible considering the low volume, short duration, rapid dissipation into the atmosphere and localized nature of a release. During the spring migration of bowhead whales and beluga whales through the spring polynya system or spring lead system (SLS) a temporary disruption of the migration could occur if release/explosion/control activities occurred during the migration period and when migrating animals are present and migrating through a release area. Short term, non lethal avoidance of activity or startle behavior in response to an explosion or short term release would be expected and potentially a short term delay in migration or a detour movement avoiding the localized area of release could occur. This would be considered a minor effect with no mortality or injury expected. Cavitation noise from the gas bubbles would be of short duration and depends on the rate of gas release, but is not anticipated to reach levels that would injure or cause temporary hearing loss by cetaceans, but could reach levels that may induce a startle or local avoidance response.

The deferral areas incorporated into Alternatives III and IV could increase the distance of a potential release from the platform to areas receiving more bowhead use. However, the probability and severity of any impacts associated with a release from the onshore facility would remain the same, and the risks associated with a release from the offshore pipeline, although remaining quite small, could increase with a lengthier pipeline.

Conclusions

Natural gas development and production could result in increased noise and disturbance to bowhead, fin, and humpback whales. Bowhead, fin, and humpback whales exposed to noise-producing activities such as vessel and aircraft traffic, construction activities, and production activities most likely would experience temporary, nonlethal effects. There is variability in whale response to certain noise sources; this variability appears to be context specific (e.g., feeding versus migrating whales) and also may be related to reproductive status and/or sex or age. Overall impacts to bowhead whales are expected to be minor; effects on fin and humpback whales are expected to be negligible.

IV.C.7. Polar Bears – Threatened and Endangered

To date, documented impacts to polar bears in Alaska by oil and gas development activities appear minimal. The potential for adverse impacts is largely associated with increases in industrial activity or expansion of industrial footprints, as well as related increases in human/polar bear interactions. Because the development and production of natural gas stemming from Sale 193 would be predicated on existing oil production infrastructure, increases to the industrial footprint would be quite small when viewed on a regional scale. Minimal impacts could result from the potential increase in human/polar bear interactions associated with expanding the onshore facility expansion, installing the offshore and onshore pipelines, and extending the production timeframe within the action area. The FWS and USGS have predicted that polar bears may be extirpated throughout much of their range within the next 40 to 75 years if current trends in sea ice reduction continue (USDOI, FWS, 2008). Nonetheless, impacts to bears as a direct result of oil and gas development activities appear to be minimal.

Effects from Natural Gas Development

The construction of new infrastructure in polar bear habitat has the potential to adversely impact these animals through disturbance and displacement. The offshore gas pipeline would require a relatively narrow corridor through areas currently proposed as polar bear critical habitat. Once buried, the pipeline would be under sea ice habitat for most of the year. The offshore pipeline would be installed during the open water season, and would be buried in the seafloor. Vessel traffic associated with natural gas development activity is not expected to cause impacts to polar bears, because they show little reaction to vessels and generally do not linger in open water where vessels are more likely to travel. As explained in the BO (FWS 2009), “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 there is an encounter between a vessel and a bear, it would most likely result in short-term behavioral disturbance only. Polar bear responses to vessels are brief, and generally include walking toward, stopping and watching, and walking/swimming away from the vessel.

Extensive or repeated overflights by helicopters travelling to and from offshore facilities could disturb polar bears. Polar bears have been known to run from other sources of noise and the sight of aircraft, especially helicopters. According to the BO (USDOI, FWS, 2009), “Behavioral reactions of polar bears would likely be limited to short-term changes in behavior and have no long-term impact on individuals. In addition, [BOEM] requires these types of flights to operate at an altitude of >1,500 ft above ground level where possible, which would significantly reduce disturbance.” It is expected that minimum flight altitude requirements will minimize disturbances, and that adverse impacts from this activity will be temporary and minimal.

Pipeline construction could cross barrier island and nearshore coastal habitats. Polar bears may be temporarily displaced, or their behavior modified (e.g., by changing direction or speed of travel), by construction activities. As explained in the BO (USDOI, FWS, 2009), “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.” Mitigation measures (such as implementation of a human–bear conflict management plan) generally required under MMPA Incidental Take Authorizations (typically a Letter of Authorization) would reduce the potential for these impacts. Any adverse impacts would be localized and negligible.

Polar bear denning habitat along the Chukchi Sea coast was not proposed for designation as critical habitat for the polar bear, because most dens have been documented to occur on Wrangel Island, and few dens are thought to occur along the Chukchi Sea coast (74 FR 56058, October 29, 2009). Should construction activities be proposed near an active den, it is possible a female and her cub(s) could abandon the den site, possibly leading to death of the cub(s). Mitigation measures (such as den detection and avoidance) generally required under the Letter of Authorization would reduce the potential for these impacts. The raised onshore pipeline would not pose a physical barrier to polar bear movement and once away from the coast would not be in polar bear habitats.

Impacts from overland vehicles such as snowmachines would likewise be temporary and would not seriously disturb or otherwise affect polar bears.

Effects from Natural Gas Production

Natural gas production activities would also risk disturbing polar bears. Potential sources of disturbance may be grouped as stationary sources (in this case including operations, maintenance, and repair activities) and mobile sources (e.g. vessels, aircraft, and vehicle traffic). Natural gas production will require the support of vessels, aircraft, and overland vehicles with similar, but less frequent effects, described for development activities.

Data and experience from past and ongoing activities in other portion of northern Alaska suggest that polar bears will habituate to or simply avoid gas production operations. The greatest risk to the polar bears from ongoing operations is the likely increase in human/polar bear interactions, which could be dangerous to both parties. In recent years, much progress has been made in reducing managing these risks. The MMPA ITR provides clear guidance to the oil and gas industry and has been very effective at preventing injury to both humans and polar bears. Under the MMPA, since 1991, the oil and gas industry in Alaska has sought and obtained incidental take authorization for take of small numbers of polar bears and no polar bears have been killed due to encounters with the current industry activities on the North Slope of Alaska (73 FR 28212, May 15, 2008). Documented direct impacts on polar bears by the oil and gas industry operations during the past 30 years are minimal.

As previously noted, there is a small potential that a large gas release could occur from a platform, pipeline or onshore facility. Impacts to polar bears would be minimal since gas quickly dissipates in the atmosphere. Potential impacts could result from a bear in the immediate vicinity inhaling gases, however this is highly unlikely. Impacts to polar bear critical habitat would occur only if an explosion resulted from the release, and would be very short term.

Conclusions

Various aspects of the natural gas development and production scenario have the potential to disturb polar bears, but any impacts would be temporary, most likely non-lethal, and would not rise to the level of significance. It should also be noted that additional Section 7, ESA consultation would be required before BOEM approves any Development and Production Plan that could follow from a lease sale. Under the current regulatory framework, Incidental Take Authorization under the MMPA would satisfy consultation requirements under the Endangered Species Act. That process would identify and require any additional, site-specific mitigation deemed necessary by FWS to avoid jeopardy to polar bears or adverse modification of critical habitat.

IV.C.8. Marine and Coastal Birds – Threatened and Endangered

Potential impacts to Threatened and Endangered marine and coastal birds in the Chukchi Sea area have been the subject of two recent Biological Opinions, which identified habitat loss, disturbance and displacement as potential causes of adverse impacts relevant to this natural gas development and production scenario. The results of FWS' analyses are used to inform much of the discussion below.

Effects from Natural Gas Development

In regards to development-related issues, FWS explains that "Given the large size of the Program Areas, significant impacts from permanent habitat loss in the marine environment are not anticipated. However, if facilities are 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." The impacts of terrestrial development, meanwhile, are highly dependent on the specific areas being disturbed. Particularly vulnerable to disturbance are nesting birds, which may flush, leaving eggs or ducklings exposed. Displacement during nesting times can also lead to reduced foraging efficiency and higher energetic costs.

Effects from Natural Gas Production

As with the small amounts of natural gas periodically flared during oil production operations, the release and flaring of 10 million ft³ of natural gas during a one day loss of gas well control event would affect few birds in the immediate vicinity. Some migrating birds may become disoriented by the flare, especially during periods of darkness or inclement weather and could increase their potential for colliding with the platform structure. As collisions with structures in the Chukchi and Beaufort seas are typically low, the effects on non-listed bird species would be minimal; however, any collision mortality of spectacled or Steller's eiders would be considered a significant adverse effect if these bird losses were not recovered within a generation. No adverse effects to coastal and marine birds are anticipated from a sudden release of natural gas from a pipeline rupture because the gas would typically dissipate into the atmosphere instead of lingering in a localized area where birds could be present.

The one aspect of the natural gas production scenario with the potential to significantly affect Threatened and Endangered marine and coastal birds is the risk of collisions with vessels and infrastructure. The FWS' 2007 BO concludes that approximately 3 adult spectacled eiders and 1 adult Steller's eider could be killed per year through collision with vessels and structures associated with the oil development and production scenario outlined in the 193 FEIS. The rough similarities between the oil development and production scenario analyzed in the 193 FEIS and the natural gas development and production scenario analyzed here suggest that FWS' estimated collision rate could be useful to the current discussion. If so applied, it would seem that 25 spectacled eiders and 2 Steller's eiders would be killed through collisions during the 20-year span of the natural gas scenario. However, certain distinctions between the oil scenario and the gas scenario should be noted to properly qualify this estimate. FWS estimate factors in development activities (i.e., pipeline construction) that would occur only for the first few years of the scenario, and which would not occur during the much-longer production-only phased. The major oil development activity considered by FWS, construction of the platform, is not a component of any portion of the natural gas scenario. An estimate of 25 spectacled eiders and 2 Steller's eiders therefore likely overstates the risk of collisions associated with development and production of natural gas.

Generally speaking, deferral areas could help reduce impacts by further distancing activities from coastal areas that typically host greater bird use.

Conclusions

The natural gas development and production scenario analyzed in this SEIS is comprised of activities that are very similar or even identical to those analyzed in the preceding FEIS, and does not include some of the higher-risk activities (i.e. seismic surveying and exploration, platform construction, oil production). In this sense, one can expect natural gas-related impacts to be a continuation of the potential adverse environmental impacts associated with the oil development and production activities analyzed in the FEIS.

The FEIS as well as each BO found notable potential for adverse impacts to Threatened and Endangered marine and coastal birds, but also explained that many of these potential impacts would be avoidable through avoidance and mitigation. It is reasonable to presume that through development of additional, site-specific mitigation measures during later environmental review processes, the new activities associated with the gas scenario (namely installing and operating an offshore gas pipeline, expanding an onshore facility, and installing and operating an onshore gas pipeline through NPR-A), would produce only minor impacts to Threatened and Endangered marine and coastal birds. No significant impacts are expected from any potential releases of natural gas. Significant adverse effects could occur from extending the life of the platform and other facilities, should high numbers of Threatened or Endangered birds from declining populations suffer mortality from collisions. Additional discussion on the types of impacts that could affect marine and coastal birds generally is provided in the section below.

IV.C.9. Marine and Coastal Birds

Marine and coastal birds could be exposed to a variety of potential negative effects during development and production of natural gas. Relevant sources of potential impacts include collision, habitat loss, and general disturbance. Sources of potential disturbance include heavy equipment, vessels, and support aircraft used during modification and operation of the production platform and shore facility, as well as the installation of offshore and onshore gas pipelines. As will be explained, the level of potential impacts depends to a great extent on the specific location and timeframe of these activities. In general, species with a relatively higher potential for substantial effects include: murre; puffins; short-tailed shearwaters and auklets; black guillemot; loons; long-tailed duck; common eider; king eider; black-legged kittiwake; Pacific brant, phalaropes; and lesser snow goose.

Effects from Natural Gas Development

Migrating birds may be directly impacted through collisions, vessel strikes, and aircraft strikes. Collisions with manmade structures are often associated with weather conditions that cause poor visibility and/or magnify the lighting system of a man-made structures. Often, artificial lights can attract disoriented birds, which may collide with the light support structure (e.g., pole, tower, or vessel). Mitigation measures pertaining to the array and use of lighting systems of vessels and platforms should reduce the potential for such impacts, which is expected to remain minor. Marine and coastal birds could also be directly impacts by aircraft strikes. However, these events are relatively rare, and could also be further reduced by mitigation required by future environmental review.

Although the natural gas development scenario entails expansion of the onshore facility and construction of offshore and onshore gas pipelines, it is unlikely that these activities would notably reduce marine and coastal bird habitat. The projected footprints of these facilities would be relatively small in terms of regional habitat availability. Also, it is fully anticipated that particularly important areas would be avoided through future, site-specific environmental review processes.

The response of marine and coastal birds to disturbances can vary depending on the species, time of year, disturbance source, habituation, and other factors (Fox and Madsen, 1997). For some species of waterfowl, the distance at which disturbances will be tolerated varies depending on flock size,

because larger flocks react at greater distances than smaller flocks (Madsen, 1985). The vessels which would support natural gas development activities would not create noise or other forms of disturbance intense enough to have a significant impact on marine and coastal birds. Though installation of the pipelines could entail relatively large-scale activity in a small portion of the coastal environment, these impacts would be reduced through future environmental review processes related to project siting, and would in any event be temporary in nature. The noise and presence of aircraft operating at low altitudes have the potential to disturb birds. Birds would flush or move away from the noise and approaching aircraft. There is an energetic cost to repeatedly moving away from aircraft disturbances as well as a cost in terms of lost foraging opportunities or displacement to an area of lower prey availability. Support aircraft flying over nesting areas could flush adults from nests with could lead to abandonment or egg/chick death from exposure to the elements or predators. Low-level flights over rearing broods could also result in the separation of adults and young, with similar consequences. Implementation of mitigation measures, such as minimum flight altitude requirements, would reduce the magnitude and frequency of aircraft related noise disturbances to coastal and marine birds. Overall, impacts from disturbance are somewhat likely, but would not be considered significant.

Effects from Natural Gas Production

Basically, natural gas production would simply lengthen the window in which marine and coastal birds could be subjected to collisions and noise. These types of impacts are analyzed in the Development subsection directly above. Of course, vessel and aircraft traffic would be less frequent during the production phase than during certain portions of development, further reducing adverse impacts.

No additional types of impacts are anticipated during natural gas production.

Conclusions

As marine and coastal bird use presence is quite variable by season and location, an accurate assessment of impacts at this early stage is difficult. Additional NEPA and other environmental review processes occurring at later stages of the OCS Lands Act program (i.e. exploration, development and production) will have site-specific plans to focus an analysis. Significant adverse impacts to marine and coastal birds would be avoided and mitigated through restriction and measures implemented during those later review processes.

IV.C.10. Other Marine Mammals

The main area of concern regarding the effects of industrial development on marine mammals is the potential for disturbance caused by industrial noise in the air and water.

Effects from Natural Gas Development

The natural gas development scenario would entail several sources of noise that could impact marine mammals, including small modifications to the platform and related infrastructure, installation of a new offshore gas pipeline, and a temporary increase in vessel and air traffic. Potential impacts will be considered for each group of marine mammals that could be present within the action area. It should be remembered that each of the following species is protected under the MMPA, and additional mitigation measures may be applied through subsequent regulatory processes.

Phocids (Ringed, Spotted, Ribbon, and Bearded Seals)

The effects of air traffic on pinnipeds in the action area are expected to be local and transient in nature. Some pinnipeds may be disturbed on the ice or at haulouts on land and enter the water, although their responses will be highly variable and brief in nature. Mitigation measures prohibiting aircraft overflights below 1,500 ft will lessen aircraft impacts to these pinnipeds. Results from studies

of an existing facility (specifically, the Northstar development) roughly analogous to what is contemplated under the present natural gas development scenario suggest that any adverse impacts to phocids would be minor, short-term, and localized, with no measurable consequences to the seal population as a whole.

Pacific Walrus

Walrus are particularly vulnerable to disturbance events given their tendency to aggregate in large groups. Reactions to disturbances when on ice are highly variable (Richardson et al., 1995a). Reactions at group haulouts (on land) are more consistent; walrus will flee haulout locations in response to disturbance from aircraft and ship traffic, though walrus in the water are thought to be more tolerant. Females with dependent young are considered the least tolerant of disturbances. Walrus are particularly sensitive to helicopters and changes in engine noise, and are more likely to stampede when aircraft turn or bank overhead. Disturbances caused by vessel and air traffic may cause walrus groups to abandon land or ice haulouts. Severe disturbance events could result in trampling injuries or cow-calf separations, both of which are potentially fatal. But while adverse impacts can be severe, they are also to a large extent avoidable. Researchers conducting aerial surveys for walrus in sea-ice habitats have reported little reaction to aircraft above 1,500 ft (457 m), meaning that BOEM's minimum altitude requirements would preclude adverse impacts to walrus, to the extent that human safety considerations permit flying at this altitude. Overall, the potential for serious adverse impacts to individual or groups of walrus does exist, but the probability of such is minimal in light of mitigation techniques such as minimum altitude requirements for aircraft. No population-level impacts are expected as a result of natural gas development.

Cetaceans

From a behavioral perspective, increased anthropogenic noise that would result from natural gas development activities could interfere with communication among cetaceans, mask important natural and conspecific sounds, or alter natural behaviors (i.e., displacement from migration routes or feeding areas, disruption of feeding or nursing). Behavioral impacts appear to be affected by the animal's sex and reproductive status, age, accumulated hearing damage, type of activity engaged in at the time, group size, and/or whether the animal has heard the sound previously (e.g., Olesiuk et al., 1995; Richardson et al., 1995a; Kraus et al., 1997; NRC, 2003, 2005). Toothed whales can be particularly sensitive to high-frequency sounds given their use of high-frequency sound pulses in echolocation, and moderately high-frequency calls for communication. Baleen whales, a group including gray and minke whales, are similarly sensitive to the low frequency noise that is often characteristic of construction, machinery operation, vessel noise, aircraft noise. Studies of gray, bowhead, and humpback whales have shown that received levels of impulses in the 160-170 dB re 1 μ Pa rms range appear to cause avoidance behavior in a significant portion of the animals exposed. Any activity causing noise reaching these levels would risk level B "harassment" take of whales, and require a take authorization under the MMPA. Additional mitigation measures required to avoid significant adverse impacts would be required by later BOEM and NMFS review processes. Detailed analysis of potential Exploration Plans and Development & Production Plans, along with mitigation measures incorporated into any necessary Incidental Take Authorizations (ITA), would further reduce the potential for any significant adverse impacts.

Effects from Natural Gas Production

The 'noisiest' period of offshore oil and gas operations occurs during exploration and site establishment (Richardson et al., 1995a). Conversely, production activities generally are quieter and require fewer support operations. Data from the Northstar facility indicates that underwater noise from vessels was detectable as far as 30 km offshore, and that noise from normal production activities reached background values at 2-4 km. Impacts from vessels are analyzed in greater detail above, within the subsection regarding development activities. Vessel traffic during the production phase

will be comparatively infrequent, and therefore represents a reduced potential for adverse impacts. Non-vessel noise associated with production would only be problematic if it deflected bowhead migration. Such deflection would be highly localized and affect only a portion of the whales migrating through the Chukchi Sea. No population-level effects are anticipated.

The potential impacts of a large gas release could occur from a platform, pipeline or onshore facility. Marine mammals are not likely to congregate in the vicinity of a platform or an onshore facility. In the event of a rupture in a sub-sea pipeline, impacts to marine mammals would be minimal since gas quickly dissipates in the atmosphere. Potential impacts could result if animals in the immediate vicinity were to inhale gases; however this is highly unlikely.

Conclusions

While the complexity of how marine mammal species react to underwater and above water sound render an exact determination of potential adverse impacts difficult, abundant regulatory review and careful design of mitigation measures are expected to preclude instances of level A, or “harm” take of marine mammals, and to reduce the potential for level B, or “harassment” take. No population-level impacts are anticipated as a result from natural gas development and/or production.

IV.C.11. Terrestrial Mammals

Among the terrestrial-mammal populations that could be affected by development activities for gas production in the Sale 193 area are caribou of the Central Arctic (CAH), Western Arctic (WAH), and Teshekpuk caribou (TCH) herds; muskoxen; grizzly bears; and arctic foxes. The primary potential effects would come from ice-road and air-support traffic (disturbance) along pipeline corridors and near other onshore-support facilities and habitat alteration associated with gravel extraction (mining) for gravel pads for onshore facilities.

The effects of development on caribou, muskoxen, and grizzly bears would likely include local displacement within about 4 km of onshore pipelines and roads (Cameron et al., 2005).

Effects from Natural Gas Development

Caribou

Caribou can be disturbed briefly by low-flying aircraft, fast-moving ground vehicles associated with onshore pipelines, and the construction of other facilities (Calef, DeBock, and Lortie, 1976; Horejsi, 1981). The response of caribou to potential disturbance is highly variable, from no reaction to violent escape reactions, depending on their distance from human activity; speed of approaching disturbance source; frequency of disturbance; sex, age, and physiological condition of the animals; size of the caribou group; and season, terrain, and weather.

Caribou have been shown to exhibit panic or violent flight reactions to aircraft flying at elevations of 60 m (162 ft) or less and exhibit strong escape responses (animals trotting or running from aircraft) to aircraft flying at 150-300 m (500-1,000 ft) (Calef, DeBock, and Lortie, 1976). However, these documented reactions of caribou were from aircraft that circled and repeatedly flew over caribou groups.

Gravel mining would alter a small area of river habitat along rivers but is not expected to disturb many caribou. Most caribou migrate south of the project area during the winter months when gravel will be mined, but small bands may be present.

Caribou successfully cross under pipelines that are elevated a minimum of 7 ft above the tundra, a requirement for onshore pipelines in the NPR-A (USDOI, BLM, 2006). Pipelines without adjacent roads and vehicle traffic are not likely to affect caribou movements.

Research has suggested that caribou in arctic Alaska generally avoid areas within 4 km of oil-field roads after they are constructed (Cameron et al., 1992; Joly, Nellemann, and Vistness, 2006). However, avoidance is not absolute and caribou may habituate to infrastructure and human activity (Haskell et al., 2006).

From the mid-1970's through the mid-1980's, use of calving and midsummer habitats by CAH caribou declined near oil-field infrastructure on Alaska's Arctic Coastal Plain (Dau and Cameron, 1986). In the Kuparuk Development Area, west of Prudhoe Bay, abundance of calving caribou was less than expected within 4 km of roads and declined exponentially with road density (Cameron et al., 2005).

Cow and calf groups appear to be the most sensitive to vehicle traffic, especially during the early summer months immediately after calving, and bulls appear to be least sensitive during that season. Minimizing traffic, especially within calving areas during the calving period, would reduce the potential for negative synergistic impacts on caribou.

The construction of roads and gravel pads may provide caribou with additional insect-relief habitat, particularly when there is little or no road traffic present. Conversely, the construction of roads and pipelines could provide vectors by which invasive species, parasites and new diseases could be introduced into the arctic environment (Kutz et al., 2004; Urban, 2006).

Tolerance to aircraft, ground-vehicle traffic, and other human activities has been reported in several studies of ungulate populations in North America including caribou (Davis, Valkenburg, and Reynolds, 1980; Valkenburg and Davis, 1985; Johnson and Todd, 1977). Cronin, Whitlaw, and Ballard (2000) maintain that effects from onshore development and production have not resulted in negative population-level effects, and that the CAH has grown throughout the period of oil-field development at a rate comparable to other herds in undeveloped areas.

These findings suggest that caribou are largely able to habituate and adapt to oil-field infrastructure. No significant impacts to caribou herds on the North Slope as a result of the gas development in the Sale 193 area are expected.

Muskoxen

Potential effects of development activities include direct habitat loss from gravel mining in river floodplains, and indirect habitat loss through reduced access caused by physical or behavioral barriers created by roads, pipelines, and other facilities (Clough et al., 1987, as cited by Winters and Shideler, 1990; Garner and Reynolds, 1986). Muskoxen concentrate and feed in riparian areas, especially in the winter months. Muskoxen may be more exposed to development than caribou, because they tend to remain year-round in the same habitat area (Jingfors, 1982); therefore, muskoxen may be more likely to habituate because of this year-round exposure.

Muskoxen cows and calves appear to be more sensitive (responsive) to helicopter traffic than males and groups without calves, and muskoxen in general are more sensitive to overflights by helicopter than by fixed-wing aircraft (Miller and Gunn, 1979; Reynolds, 1986). A cow disturbed during the calving season may abandon her calf, if the calf is a day or two old (Lent, 1970). However, muskoxen appear to get used to helicopter flights above 500 ft (180 m), at least for a time (Miller and Gunn, 1980). Groups of muskoxen responded less to fixed-wing flying over them during the summer, rutting season, and fall than during winter and calving periods (Miller and Gunn, 1980; Reynolds, 1986).

No significant impacts to muskoxen on the North Slope as a result of the gas development in the Sale 193 area are expected.

Grizzly Bears

Major sources of noise and disturbance include air and ground vehicle traffic and human presence associated with onshore operations, such as construction of ice roads, installation of onshore pipelines, and gravel mining. These activities may disturb grizzly bears occurring within a few miles of the activities.

Responses to ground-based human activities are stronger than responses to aircraft, especially when encounters occur in open areas such as the Arctic Slope (McLellan and Shackleton, 1989). The establishment of permanent (oil fields, mines, etc.) usually leads to human-bear encounters on a regular basis and to conflict, particularly when bears learn to associate humans with food (Schallenberger, 1980; Harding and Nagy, 1980; Miller and Chihuly, 1987; McLellan, 1990). Some bears may habituate to human noise and presence, leading to an increase in encounters. However, individual bears vary in the degree of habituation-tolerance to human presence, and some will continue to avoid areas where humans are present (Olson and Gilbert, 1994).

Most onshore construction activities such as gravel mining, ice-road construction, and ice-road traffic are assumed to occur during the winter months when grizzly bears are denning. Grizzly bears use earthen dens along riverbanks during winter months where gravel extraction for the construction of gravel pads and gravel islands supporting offshore oil development may occur. This activity could disturb and displace a few bears from den sites. Implementing the guidelines in the MMS publication *Guidelines for Oil and Gas Operations on Polar Bear Habitats* could reduce the chances of adverse grizzly bear-human interactions that may lead to the injury or loss of people and bears.

Arctic Fox

Development infrastructure can increase the availability of food and shelter for arctic foxes. Facilities provide additional food sources for foxes at dumpster sites near the galley and dining halls and at dumpsites (Eberhardt et al., 1982; Rodrigues, Pollard, and Skoog, 1994). Crawlspace under housing, culverts, and pipes provide foxes with shelter for resting and, in some cases, artificial dens (Eberhardt et al., 1982; Burgess and Banyas, 1993).

Oil development on the North Slope has not harmed the fox population (Eberhardt et al., 1982). Arctic fox numbers and productivity are higher in the Prudhoe Bay area compared to adjacent undeveloped areas (Burgess et al., 1993). A study of den sites and fox productivity in the area of Prudhoe Bay indicates that adult fox densities and pup production are higher in the oil fields than in surrounding undeveloped areas (Burgess et al., 1993). An increase in the fox population associated with development may adversely affect some fox-prey species (such as ground-nesting birds) in the area of infrastructure (Burgess et al., 1993).

Also helping to reduce potential disturbance of each of the above species, BOEM distributes an Information to Lessees (ITL) regarding Bird and Mammal Protection. This document recommends air- and vessel-traffic distances to avoid disturbance of bird and marine mammals that generally use many of the same coastal habitats as these terrestrial mammals. The ITL serves to alert industry to the potential effects of air and vessel traffic and to recommend measures to reduce those effects. By As a result of their habitat similarities to birds and marine mammals, the ITL also is expected to reduce noise and disturbance effects of air and vessel traffic on caribou, muskoxen, grizzly bears, and arctic foxes.

Effects from Natural Gas Production

Caribou and muskoxen would be periodically exposed to disturbances from road and air traffic related to maintenance of the gas pipeline across NPR-A. These effects are expected to be temporary and negligible at the population level. The small potential for a large natural gas release is also of little concern. The distance between any of the sale areas and the coast is such that it is extremely

unlikely any natural gas released in offshore areas could contact the coast and thus any of the terrestrial mammals on the coast. More generally, natural gas will weather and dissipate quickly in the Beaufort or Chukchi, preventing widespread issues. Overall the effects from a natural gas blowout or any other accident should be much lower than that which would be expected for a similar crude oil accident.

Conclusions

It is likely that several species of terrestrial mammals would be temporarily disturbed by natural gas development, and to a lesser extent, natural gas production activities. Negative impacts of this type can be difficult to quantify. However, existing data and anecdotal evidence strongly suggest that no species of terrestrial mammal would suffer significant adverse impacts.

IV.C.12 Vegetation and Wetlands

Foreseeable adverse impacts on terrestrial vegetation communities would be caused by the expansion of the shore-base facility, construction of the gas pipeline across NPR-A, gravel quarrying, and continued use of the gravel road along the pipeline corridor across NPR-A. Disturbances include loss of tundra vegetation acreage, damage or destruction of vegetation cover, shift in plant species composition, and introduction of noxious weeds.

Effects from Natural Gas Development

The expansion of the shorebase facilities to support natural gas production would have minor impacts on some of the plant communities. These impacts would be localized and could include loss of tundra acreage, damage or loss of vegetation cover, shift in species composition, and introduction of noxious weeds.

These impacts from the construction and maintenance of pump stations, pipelines, vertical supports, and communication lines along a 300-mi pipeline corridor stretching eastward. Impacts on vegetation due to gravel borrow pits, gravel pads, and gravel roads also would be expected from the construction of both the pipeline system and the shore-base facility.

Tundra vegetation cover would be removed permanently in areas where gravel pits are established. Tundra vegetation also would be buried under gravel pads established for the construction of pump stations and under gravel roads and runways. Communication lines and vertical supports also would require the removal or burying of tundra vegetation. Buried vegetation likely would die. Permanent gravel roads and pads would have direct impacts on plant communities. As they would greatly differ from adjacent substrates, gravel pads would be composed by a set of completely different plant species if colonized. Most changes in plant communities around gravel pads and gravel roads would occur within about 50 m of the structure. Changes in plant-species composition also likely would occur in areas affected by thermokarst. Thermokarst (irregular depressions caused by melting and heaving of frozen ground) likely would occur where gravel roads and gravel pads cause changes in adjacent areas' moisture regime, natural drainage patterns, or snow-drift patterns (NRC, 2003b). Snow drifts caused by gravel structures increase wintertime soil-surface temperature and increase thaw depth in soils near the structures that, in turn, produce thermokarst and alter species composition of plant communities. Warmed soils enhance nutrient availability leading to increases in annual primary production and a shift toward graminoids-dominated communities characterized by low plant species diversity.

Roadside dust produced on gravel roads is known to cause loss of vegetation, specifically of mosses typically found on acidic tundra. Sphagnum moss is particularly sensitive to the toxic effects of calcium in the dust; a significant reduction or elimination of sphagnum moss, especially in the 0-10 m adjacent to the road, has been reported in acidic tundra (Walker et al., 1987). Mosses promote low soil temperatures and permafrost development by conducting heat under cool, moist conditions and

by insulating soils under warm, dry conditions (Oechel and Van Cleve, 1986). Mosses are a large component of the vegetation of the western North Slope; among the common ones are sedge/grass, moss wetlands (W1), sedge/moss/dwarf shrub wetlands (W2), and tussock-sedge/dwarf shrub/moss tundra (G4). Another impact is the earlier meltdown of the snow drift accumulated near roads, because the darker dust covering snow surfaces absorb more heat. Earlier meltdown could provide early open areas to wildlife several days or weeks before adjacent snow-covered tundra becomes accessible. The use of chip-seal treatment (an application of asphalt followed with an aggregate rock cover) of roads could dramatically reduce the impacts of roadside dust generation (NRC, 2003b) in roads designed to be permanent.

Plant species sensitive to disturbance and with poor potential for recovery usually are common wetland species and include *Eriophorum vaginatum*, *Ledum palustre* spp. *decumbens*, *Vaccinium vitis-idaea*, *Dryas integrifolia*, *Betula nana*, *Arctostaphylos rubra*, *Salix phlebophylla*, and *S. reticulata* among others. Some mosses, particularly *Sphagnum* sp. and *Tomentypnum nitens*, and all lichens also are very sensitive to disturbance with slow recovery rates. Direct physical effects on vegetation due to disturbances related to roads and gravel pads, as well as other impacts, can reduce the insulating quality of the vegetation and cause added disruption of the surface by thawing the underlying ice-rich permafrost (NRC, 2003b).

There is the potential to introduce non-native plants and noxious weeds with heavy equipment used in gravel borrow pits, pipelines, and so forth. Non-native plant species, however, may lack physiological and morphological adaptations required to survive extreme arctic conditions. Their growth and reproduction would be limited by extreme low temperatures in the soil and aboveground, short photoperiods, and sporadic midsummer freezings (NRC, 2003b).

Reasonably foreseeable impacts on wetlands and terrestrial vegetation communities would be localized and would not adversely affect the functions of wetland ecosystems at a regional scale. These impacts would be moderate to significant at a local scale, but would have a small effect on the ecological functions, species abundance and composition of wetlands and plant communities of the North Slope at a regional scale. Impacts on tundra vegetation and palustrine wetlands due to small oil spills and small discharges (saline water, hydraulic fluids, and diesel) are likely to be minor, because these spills would be localized and in small quantities.

Standard operating practices for operating on the North Slope are expected to be implemented on a site-specific basis. These practices, which are discussed in Section IV.B.10 of the 193 FEIS, are expected to protect tundra vegetation and wetlands from direct impacts to the greatest extent practicable. Notable standard practices include extracting gravel during winter months, using ice roads and ice pads for transport and construction activities, and building gravel pads to a thickness over 1.8 meters (and potentially placing polyethylene insulation under the pad itself) to protect against thawing of permafrost.

Effects from Natural Gas Production

Loss of vegetation, specifically of mosses and lichens typically found on acidic tundra, could occur from roadside dust from continued road use related to maintenance of the gas pipeline across NPR-A. Discharges that could occur during production of natural gas include diesel, hydraulic fluids, and other fluids used in operating the shore-base facility and pump-station equipments. Vegetation recovery from diesel fuel spills would be slow. In experimental spills of diesel fuel, tundra plant communities on diesel fuel plots showed no recovery after 1 year, with almost no recovery of mosses, lichens, and dicots (no graminoids).

Conclusions

Given the unique sensitivity of the tundra ecosystem in the region analyzed, some potential impacts to vegetation associated with natural gas development and production may be long lasting (e.g.

disruption of slow-recovering vegetation communities) or even permanent (e.g. thermokarst). These impacts would, however, be highly localized and insignificant on a regional scale.

IV.C.13. Economy

Natural gas development and production would generate economic activity manifested primarily in employment, personal income, and revenues to the government. Economic effects would occur in the North Slope Borough (NSB), the rest of Alaska, and the rest of the U.S. The exploration and development scenario in Section IV.A is the basis for analyzing potential economic effects in this section. The reader should refer to that section for timing of OCS activity. The activities, construction, and operation of infrastructure described in the gas development and production scenario generate economic activity. The resulting increases in employment and personal income would occur in two distinct phases: development and production. In general, employment numbers and associated personal income peak during development, then drop to a plateau during the production phase as production rates decline.

Section IV.A.1 defines significance threshold for economics as effects “that will cause important and sweeping changes in the economic well-being of residents in the area or region. Local employment is increased by 20% or more for at least 5 years”. The term “local employment” here means workers that are permanent residents of the NSB, both Inupiat and non-Inupiat, and does not include North Slope oil-industry workers who commute to residences within or outside of Alaska. Revenues accruing to local, state, and Federal government can also cause changes in economic well-being.

Effects from Natural Gas Development and Production

Natural gas development and production under Sale 193 would have a positive impact on employment, personal income, and revenues in the region. Under the significance criteria above, employment and personal income effects from natural gas activities would be insignificant. However, property tax revenues accruing to the NSB would be substantial.

Employment and Personal Income

Employment and personal income effects during the natural gas development phase are assumed to be similar to the effects described for oil development and production in section IV.C.1.k. and Table IV.C-1 in the 193 FEIS. Natural gas development would initially cause a small increase in employment and personal income in 2030 as additional workers would be needed to modify, expand, and develop new infrastructure associated with gas production as oil production rates decline and operations shift toward natural gas development. This small increase from the additional man power required to expand and modify the existing shore base to support gas production would continue during the 10 year transition period of 2035-2044, where both oil and gas would be produced from the offshore platform, and then taper off in later years of production back to the levels provided in Table IV.C-1 in the 193 FEIS.

The employment and personal income associated with gas development will be slightly less than the employment and personal income associated with oil development, since most of the infrastructure necessary for gas development and production (roads, facilities, etc.) will have already been built for oil production prior to gas development, which is projected to begin in 2030. Just as local employment and personal income effects would be insignificant from oil development described in the 193 FEIS, local employment and personal income effects from gas development would continue to be insignificant under the significance threshold listed above.

While a relatively small share of the direct jobs are expected to be taken by local residents, most of the infrastructure, government, and support jobs are expected to be taken by local residents.

Revenues

Natural gas development and production would generate property tax revenues for the NSB totaling approximately \$90 million over the depreciable life of the shore based gas support facilities and overland pipeline. The onshore infrastructure will be completed in 2035 and be assessed coincident with projected declines in NSB property tax levels. The contribution from this new infrastructure to NSB property tax revenue could peak as high as \$27.75 million in year 2035, representing an increase in NSB property taxes of about 32% above the level of projected Borough revenues without natural gas development and production.

Gas development and production would generate increases in property tax revenues to the State of Alaska of \$2.25 million, with a total of \$7.3 million accruing to the State over the depreciable life of the infrastructure. Given the geographical location of the parcels to be leased, no royalties would flow to the State from gas production. The Federal government, however, would receive royalties from the projected gas production totaling \$2.7 billion over the life of the production profile.

Natural gas from Sale 193 leases will contribute to extending the useful life of a large capacity North Slope gas pipeline to outside markets.

Conclusions

Natural gas development and production under the Proposed Action would result in a variety of beneficial economic impacts, namely employment, personal income, and revenues.

IV.C.14. Subsistence-Harvest Patterns

Access to subsistence resources and subsistence hunting areas could be affected by reductions in subsistence resources and changes in the distribution of subsistence resources. These changes could occur as a result of noise and disturbance from aircraft and vessel traffic, support-base expansion; and pipeline construction and maintenance.

Effects from Natural Gas Development

The noise-producing activities are those most likely to produce disturbance effects on critical subsistence species that include bowhead and beluga whales, seals, fish, caribou, and birds. Noise disturbance would be associated with aircraft and vessel support of modifications to platform facilities, installation of a gas pipeline from the platform to shore, expansion of shore facilities, and construction of the gas pipeline across NPR-A.

Most bowheads exhibit no obvious response to helicopter overflights at altitudes above 150 m (500 ft). At altitudes below 150 m (500 ft), some bowheads probably would dive quickly in response to the aircraft noise. Bowheads are not affected much by aircraft overflights at altitudes above 300 m (984 ft). Below this altitude, some changes in whale behavior might occur, depending on the type of plane and the responsiveness of the whales present in the vicinity of the aircraft. Fixed-wing aircraft flying at low altitude often cause hasty dives. Reactions to circling aircraft are sometimes conspicuous if the aircraft is below 300 m (1,000 ft), uncommon at 460 m (1,500 ft), and generally undetectable at 600 m (2,000 ft). The effects from such an encounter with either fixed-wing aircraft or helicopters generally are brief, and the whales should resume their normal activities within minutes. There is variability in their response to certain noise sources. Some of the variability appears to be context specific (i.e., feeding versus migrating whales) and also may be related to reproductive status and/or sex or age. This potential effect could be mitigated by ensuring that flight paths avoid whale aggregations or that flights are high enough to avoid disturbance. Overall, bowhead whales exposed to noise-producing activities such as vessel and aircraft traffic and pipeline construction activities most likely would experience temporary, nonlethal effects.

Even a brief disturbance response from aircraft and vessel noise might temporarily interrupt the movements of belugas or temporarily displace some animals when vessels pass through an area. Such events could interfere especially with beluga movements to and from the lagoon areas, particularly Kasegaluk Lagoon where the community of Point Lay hunts belugas; this harvest is concentrated during a few weeks in early July. Reducing or delaying the use of these habitats by belugas could affect their availability to subsistence hunters. There is evidence that belugas will accommodate or acclimate to a particular pattern of noise after extensive exposure, and such acclimation also could affect Inupiat hunter access. For example, Point Lay residents rely on the harvest of belugas more than any other Chukchi Sea village and, at the present time, they are very successful at herding these animals by boat into Kasegaluk Lagoon where they are then hunted. If noise from boat-traffic activity increased and the belugas acclimated to the noise, there is the possibility that this herding technique would be less successful and the hunt reduced.

Aircraft traffic (particularly helicopter trips) and supply-boat traffic is assumed to be a potential source of disturbance to bearded, ringed, and spotted seals hauled out on the ice or beaches along the coast. Air-traffic disturbance would be very brief and would disturb small groups of seals hauled out along the coast. The effects of air traffic on pinnipeds in the action area are expected to be local and transient in nature. Some groups of pinnipeds may be disturbed from their haulouts and enter the water, although their responses will be highly variable and brief in nature.

Activities that occur during ice-minimum conditions in summer in the Chukchi Sea are likely to come into direct contact with adult females and subadult walrus (Jay et al., 1996). If disturbance causes walrus to abandon preferred feeding areas or interferes with calf-rearing, resting, or other activities, then the walrus population could be negatively affected. Walrus will flee haulout locations in response to disturbance from aircraft and vessel traffic, although reactions are highly variable (Richardson et al., 1995a). Females with dependent young are considered the least tolerant of disturbances. Helicopters are more likely to elicit responses than fixed-wing aircraft, and walrus are particularly sensitive to changes in engine noise and are more likely to stampede when aircraft turn or bank overhead. Researchers conducting aerial surveys for walrus in sea ice habitats have reported little reaction to aircraft above 1,000 ft (305 m). Brueggeman et al. (1991) reported that 81% of walrus encountered by vessels in the Chukchi Sea exhibited no reaction to ship activities within less than a kilometer, which suggests that walrus may be tolerant of ship activities and movements.

Aircraft- and vessel-noise and presence could displace birds from the local area. Little direct mortality is expected, but losses of eggs and young to predators when adults are displaced is likely to occur.

Vessel traffic associated with development activity is not expected to cause impacts to polar bears, because they show little reaction to vessels and generally do not linger in open water. Polar bears could experience short-term, localized aircraft-noise disturbance—effects that would cause some disruption in their harvest—but this is not expected to affect annual harvest levels.

Aircraft traffic overhead of caribou and other terrestrial mammals (muskoxen, grizzly bears, and arctic foxes) could cause localized disturbance to these animals and some short-term disruption to the harvest, but is not expected to cause caribou and other terrestrial mammals to become unavailable to subsistence hunters.

An extensive discussion on traditional knowledge about noise and disturbance effects on subsistence resources and harvest is provided in Section IV.C.1.l(1)(a)6) of the 193 FEIS. Many Inupiat whale hunters express a traditional belief that whales can detect sounds much farther than can be measured by scientific instruments. This traditional belief implies that whales can perceive sounds and changes in the environment that cannot be detected by hearing, as hearing is defined by science. One of the most serious concerns to North Slope Inupiat is that potential increases in noise from oil development could disrupt normal migration of bowhead whales, forcing subsistence whalers into longer hunts

farther from shore. A common theme among the Northwest Alaska coastal communities and along the eastern shore of the Chukotka Peninsula is that beluga whales are sensitive to noise and to the noise of outboard motors in particular (Huntington and Mymrin, 1996; Huntington, 1999; Mymrin, 1999). The observations about the effects of noise on beluga whales are widespread and probably very old in traditional knowledge. Nuiqsut whaling captain Frank Long, Jr., stated that oil-industry activity offshore has affected not only whales but also seals and birds (Long, as cited in NMFS, 1993). According to studies and public scoping comments, low-altitude helicopter and scientific survey flights divert caribou and other terrestrial subsistence species from air-transport corridors and survey transects. Nuiqsut residents have noted that aircraft have diverted subsistence resources away from areas where hunters were actively pursuing them, directly interfering with harvests or causing harvests to fail (USDOI, BLM, 2004). If resources are diverted from traditional areas, increased travel distances for hunters result in greater expenditures for fuel and equipment because of greater wear and tear on snowmachines, outboards, and four-wheel vehicles.

Noise and disturbance from aircraft and vessel traffic would have localized and short-term effects could cause some disruption to the subsistence harvest but would not cause bowheads, belugas, seals, walrus, caribou and other terrestrial mammals, birds, or polar bears to become unavailable to subsistence hunters (Braund and Burnham, 1984; USDOI, MMS, 1987c, 1990b, 1995a, 1998; USDOI, BLM, 2005).

Restrictions on aircraft altitudes and vessel speed, and prohibitions on approaching marine mammals are expected to lessen the effects of noise disturbance to these subsistence species, and thus mitigate effects to subsistence activities.

Onshore and offshore construction could displace key subsistence such as bowhead and beluga whales, seals, walruses, caribou, waterfowl, fish, bears, wolves, and other furbearers. Consequently, subsistence hunters would travel farther, at greater costs and effort.

Offshore pipeline effects on subsistence resources and harvest would be confined to the period of construction and, to some extent, would be mitigated through lease stipulations designed to minimize industry activities during critical subsistence-use periods. Noise, disturbance, and habitat alterations from offshore pipeline laying could have some adverse effects on marine mammals (USDOI, MMS, 1987c, 1990b, 1998, 2003a,b,d; USDOI, BLM, 2005). Disturbance from construction activities could cause some animals to avoid areas in which they normally are harvested or to become more wary and difficult to harvest. Scientific and local Native knowledge of the behavior of marine mammals and the nature of noise associated with offshore oil and gas activities suggest that intense noise causes startle, annoyance, and flight responses. Some whales could be displaced seaward by construction and noise disturbance. In terms of subsistence activities, this effect may be most adverse for construction noise during bowhead migration. Traditional Inupiat observation and experience affirms that whales are affected by noise at greater distances and alter their swimming directions for longer periods. Noise and disturbance and habitat alterations from offshore pipeline installation would have a short-term and local effect on the subsistence harvest of marine mammals (USDOI, MMS, 1987c, 1990b, 1998, 2003a, 2006a; USDOI, BLM, 2005).

Depending on the construction season, the construction of an offshore pipeline could displace and/or disturb marine and coastal birds in a variety of pelagic, nearshore, and estuarine terrestrial habitats. The construction of a pipeline between a production platform and an onshore base could cross many important bird habitats. Activities that take place in summer could temporarily displace birds using areas near such sites for one season or less. Local disturbance of birds within about 1 km of construction activities would be short term, and would have a short-term and local effect on the subsistence harvest.

Construction activities related to expansion of the shore facilities would have disturbance effects on subsistence resources and the subsistence harvest specific to that area. If the shore facilities are in the

vicinity of Wainwright, as assumed for this analysis, expansion of the facilities could disturb walrus in the vicinity of Peard Bay, a walrus harvest area preferred by Barrow and Wainwright residents.

Onshore construction noise, lights, and traffic would divert and displace caribou and furbearers, resulting in decreased availability of these resources to hunters near these locations. Disturbance to caribou, moose, muskoxen, grizzly bears, wolves, wolverines, arctic foxes, and small mammals would occur for the duration of expansion of the shore facilities and construction of a pipeline across NPR-A and would be most intense during the construction period, but would subside after construction is complete.

Onshore, because nesting sites are scattered at low density on the Arctic Coastal Plain, relatively few sites are likely to become unavailable through pipeline location in areas of gravel extraction, and only small numbers of nesting birds are likely to be displaced away from the vicinity of onshore pipeline corridors (a few hundred meters) by construction activity, vehicle-traffic disturbance, or helicopter traffic for pipeline inspections. Routine disturbance effects would persist over the life of the field and would be localized primarily within about a kilometer of the pipeline.

A small number of polar bears located within a few kilometers of the offshore pipeline landfall, shorebase expansion, and onshore pipeline construction could be disturbed and displaced and the effect on the subsistence harvest would be short-term and localized.

It is expected that various Sale 193 lease stipulations would help reduce the potential for adverse impacts in the event that the sale is reaffirmed. Notable examples include Stipulation 2, which requires workers to be oriented regarding important local issues; Stipulation 4, which requires marine mammal monitoring; and Stipulation 5, which requires industry to coordinate with local leaders prior to engaging in activities that could affect subsistence-harvest patterns. It is also expected that the potential for adverse impacts to subsistence-harvest patterns is reduced through implementation of deferral areas. Distancing activities such as platform construction and production as well as vessel traffic further from coastal areas would reduce the potential for disturbing subsistence-harvest patterns. While Alternative IV in this sense exhibits less potential than Alternative I for impacts to subsistence-harvest patterns, Alternative III offers the greatest potential advantages in this area.

Effects from Natural Gas Production

During the natural gas production phase, after construction, effects to subsistence activities are expected to return to levels experienced during the oil production phase. Because gas processing would be accommodated by an expansion of the oil processing facility and the overland pipeline will be constructed along the same corridor as the oil pipeline, effects to subsistence resources and subsistence-harvest activities are expected to increase minimally, if at all, as compared to the effects of development and production as analyzed in the 193 FEIS. The analysis in the FEIS concluded “No resource or harvest area would become unavailable or undesirable for use because of noise and disturbance, and no resource would experience overall population reductions.”

Conclusions

While natural gas development and production is not expected to appreciably reduce any populations of subsistence species, it is possible that disturbance caused by these activities could alter the local availability of these resources to harvesters. These impacts would be considered short-term and localized, and would not rise to the level of significant adverse effects.

IV.C.15. Sociocultural Systems

In determining the intensity of the potential adverse effects from Sale 193 natural gas development and production to sociocultural systems, we look at the magnitude and duration of disruption, with “significant” effects equated to conditions described as a chronic disruption of social organization,

cultural values, and institutional organization for a period two to five years with a tendency toward displacement of existing social patterns.

Potential effects to social organization could occur if Sale 193 natural gas development and production alter employment or income characteristics of the area, change the demographics of the area, result in changes to the workforce, or otherwise affect the social well-being of area residents. Although Sale 193 natural gas development and production are expected to provide significant revenues to the NSB, substantive changes in local employment and income characteristics are not expected to occur (see Section IV.C.1.k). Short-term increases in local employment may occur related to gas development activities. Historically such employment opportunities, particularly as they translate into Native employment, have been insignificant; this is expected to continue. But even though Native employment in oil-related jobs on the North Slope is currently low, Native leaders continue to push for programs and processes with industry that encourage more Native hires. In particular, hiring and employment practices that value and facilitate continued participation in the subsistence activities are encouraged by the NSB and local residents. Increased employment opportunities would provide some economic benefits.

Potential effects to cultural values could occur if Sale 193 natural gas development and production alter subsistence harvest, known archaeological or cultural sites, and cultural continuity. No resource or harvest area is expected to become unavailable or undesirable for use because of noise and disturbance and no resource would experience overall population reductions from Sale 193 natural gas development and production (see Section IV.C.1.l). Adverse effects to archeological or cultural resources are not expected to occur as a result of Sale 193 natural gas development and production (see Section IV.C.1.n).

Potential effects to institutional organization could occur if Sale 193 natural gas development and production affect how institutions are structured or how they function to provide services and foster community stability. Sale 193 gas production would represent a continuation of routine and maintenance activities related to operation of the platform, shorebase, and pipelines. Continuation of these activities is not expected to require any changes to community or Borough services. Local employment would stabilize population and density and slow the rate of decline and increase the stability of the community in the short term.

Sale 193 natural gas development activities could cause noticeable disruption to local sociocultural systems for a period of several years. Wainwright (the community nearest the shorebase) may experience significant short-term effects. Noticeable disruption most likely would result during development from the expansion of onshore infrastructure. The effect of expansion of the shorebase, however, would be much less than the effect of the initial construction of the shorebase and the introduction of a new level of industrialization. Overall, the level of effects would not be sufficient to displace existing social patterns at the regional level.

The shorebase would serve as an enclave to house project-related workers, who would largely travel out of the area during shift changes. Sufficient housing is expected to be available to handle what influx may occur. Any influx of new residents from development and production related employment would be expected to have little direct and indirect consequences to local Inupiat sociocultural systems. The proximity of the shore base to Wainwright may bring non-resident workers at the enclave and others into greater contact with local area residents. Positive and negative effects may result from this interaction.

Conclusions

The following conclusions may be drawn from the analyses:

- At the regional level (NSB), effects from Sale 193 natural gas development and production should not exceed the significance threshold.

- At the local level (Wainwright in the scenario), effects from Sale 193 natural gas development and production should not exceed the significance threshold.
- Mitigation measures should prove effective in ameliorating many of the effects of Sale 193 natural gas development and production. Social systems are expected to successfully respond and adapt to the change brought about by the continuation of production activities. This accommodation response represents circumstances that should not exceed the significance threshold.

IV.C.16. Archaeological Resources

Effects from Natural Gas Development

Archaeological surveys and analyses are required in areas where potential archaeological resources are at risk from offshore operations. Under the National Historic Preservation Act (NHPA), consultation with the Alaska State Historic Preservation Office is required for any activities that may adversely affect archaeological resources or historic properties. Preconstruction surveys and additional mitigation measures, which may flow from the NHPA Section 106 process would largely preclude, or at least reduce, the potential for adverse impacts to these resources.

Any offshore activity that disturbs the seafloor in water depths <60 m in areas not identified as having high-density ice gouging, has the potential to affect prehistoric and historic shipwreck archaeological resources. Prehistoric archaeological resources are not expected in areas where water depths exceed 60 m, because these areas of the continental shelf would have become submerged by rising sea level prior to 13,000 years Before Present (B.P.). Any activity that disturbs the seafloor in water >50 m has the potential to affect historic resources such as shipwrecks, abandoned relics of historical importance, or airplanes. Physical disturbance of resources could damage or destroy shipwrecks or artifacts, or cause a loss of site context with resulting loss of archaeological data or artifacts. Activities related to gas development that have the potential to disturb offshore archaeological resources are anchoring and pipeline trenching.

Pipeline construction in the area of Peard Bay and seaward in a northerly direction could disturb shipwreck resources, where historic accounts have identified five whaling barks wrecked since 1871, two steam whalers wrecked in 1897, and another steam freighter wrecked in 1924. Yet the potential is very small for a natural gas pipeline installed along the same corridor as a then-existing oil pipeline (for which archeological clearance will have already been performed) to actually impact such resources. Comparing alternatives, there is a positive correlation between the size of the area deferred from leasing and potential impacts to archeological resources, but the overall potential for impacts remains small under each action alternative.

Any onshore activity that removes or disturbs soil and/or causes shallow permafrost to thaw has the potential to disturb archaeological resources. Activities related to gas development that could damage previously unidentified onshore archaeological resources are expansion of shore facilities, construction of a gas pipeline across NPR-A, and gravel mining, particularly along the trend of paleo-riverbanks or buried over-bank deposits.

We assume that onshore pipelines would be elevated with vertical support members (pilings). These probably would disturb <2 ft² (0.2 m²) of soil to a depth of several tens of feet (tens of meters), but could penetrate soil horizons of potential archaeological significance. Any archaeological site beneath or near the pipeline right-of-way has the potential for being disturbed by the construction of roads and installation of the pipelines.

Effects from Natural Gas Production

Continued potential access to historic and prehistoric sites presents continuing potential for damage to these sites by human activities and possibly vandalism.

Conclusions

There is a small potential that certain natural gas development activities could cause irreversible adverse impacts to currently unknown archeological resources. Such impacts could be significant. However, the potential for significant adverse will be further reduced through adherence with standard pipeline construction protocols and measures identified during the NHPA Section 106 consultation process.

IV.C.17. Environmental Justice

Alaska Inupiat Natives, a recognized minority, are the predominant residents of the NSB. There are no significant numbers of “other minorities” in potentially affected Inupiat communities. Inupiat Natives are the only minority population allowed to conduct subsistence hunts for marine mammals in the region. No “other minorities” are allowed to participate in subsistence marine mammal hunts and, therefore, would not constitute a potentially affected minority population (NSB, 1999). Because of the nearly homogeneous Inupiat population, it is not possible to identify a “reference” or “control” group within the potentially affected geographic area (for purposes of analytical comparison) to determine if the Inupiat are affected disproportionately.

Low income commonly correlates with Native subsistence-based communities in coastal Alaska; however, subsistence-based communities in the region qualify for EJ analysis based on their racial/ethnic minority definitions alone (USDOC, Bureau of the Census, 2000, 2002). The 2000 Census identifies no nonsubsistence-based coastal communities in the NSB with median household incomes that fall below the low income threshold.

“Significant” effects on EJ are defined as: disproportionately high adverse impacts to low-income and minority populations. Coastal communities could experience impacts on subsistence resources and subsistence-hunting practices as a result of noise and disturbance from aircraft and vessel traffic; pipeline construction, shorebase expansion, and ice-road construction. Potential significant impacts to subsistence resources and harvests and consequent impacts to sociocultural systems could result in adverse EJ impacts. The potential effects of Sale 193 natural gas development and production would focus on the Inupiat communities of the region.

Metabolic health effects may accrue if subsistence resources became unavailable or undesirable for use, if subsistence foods were displaced from the diet by increased availability or affordability of store-bought foods, or if subsistence were displaced as a primary source of nutrition because of cultural change. Displacement or contamination of resources that substantially reduce intake of subsistence foods would increase the risk of increased prevalence of metabolic disorders.

Sale 193 natural gas development and production could contribute to various ambient and ongoing localized and regional effects on social pathology (assault, alcohol and drug abuse, domestic violence, suicide, and homicide). The associated health outcomes would be expected to parallel sociocultural changes to some extent. The most important sources of impacts would include:

- Influx of temporary personnel into Inupiat villages, leading to cultural conflicts and the potential for alcohol and drug importation.
- Stress, tension, and increased demands on individual time because of opposition to increasing potential on- and offshore development.
- Acculturation stress, secondary to influences to disturbances such as the influx of outside oil and gas workers entering a community, marked and rapid socioeconomic changes, and altered availability of subsistence resources.
- Potential local and regionwide increases in income and employment, leading to a general stabilization of social pathology. An important caveat is that increased income disparity, to

the extent that it occurs, may tend to increase community tension and may thus worsen these problems.

Injury rates could be affected by Sale 193 natural gas development and production through three pathways:

- Displacement of subsistence animals resulting in increasing the time and effort needed to harvest resources.
- More erratic and aggressive behavior of subsistence animals disturbed by gas development and production activities.
- Social pathology leading to increased rates of alcohol and substance abuse and, hence, increasing the risk of accidents, as discussed above.

The degree to which injury rates change as a result of the Sale 193 natural gas development and production will depend on the degree to which the potential impacts on sociocultural characteristics, subsistence, and drug and alcohol importation into the villages occur.

Overall air quality impacts of Sale 193 natural gas development and production are projected to be low, therefore the impact to human health from emissions related to gas development and production is expected to be low. Regional, seasonal, and local variations could occur, which could have potential effects on human health. These variations would be determined and mitigated on a site-specific basis at the time of consideration of the proposed siting of shorebase facilities.

Increased travel, the introduction of new populations, and the influx of visitors and temporary workers from outside the North Slope region related to Sale 193 natural gas development and production represents a potential source of infectious disease transmission, including sexually transmitted diseases, respiratory diseases, and other infections, to local residents.

For many years, North Slope residents have expressed concerns regarding possible contamination of the environment, and in particular of subsistence foods, by local industrial development, and the potential effects to human health. Environmental contaminants may enter the human environment through airborne emissions (as discussed above), through consumption of contaminated vegetation, or through consumption of subsistence species that are contaminated or that have consumed contaminated prey or vegetation. As previously discussed, emissions related to Sale 193 natural gas development and production are expected to be within NAAQS standards, are not expected to adversely affect overall air quality of the Chukchi Sea Planning Area or directly affect human health. Adverse effects to water quality from development activities are expected to be short term and localized. No discharges related to gas production are expected to occur. Therefore, absent an unforeseen accidental event, no health impacts from contaminated subsistence foods is expected as a result of Sale 193 natural gas development and production. . It is possible that the deferral areas under Alternative IV and, to a greater extent, Alternative III could reduce the potential for adverse impacts by further distancing any discharges, emissions, etc from populated areas.

The “social determinants of health” (SDH) is a term used to describe the powerful and highly reproducible association between an array of socioeconomic and environmental factors (many of which have been studied individually with regard to health outcomes)—including social hierarchy, social exclusion, social support networks, income inequity, employment, educational opportunity, cultural integrity, food security, early childhood environment, and stress—and specific health diagnoses. Summarizing the importance of the SDH to health, a conference in 2002 concluded:

The socioeconomic circumstances of individuals and groups are equally or more important to health status than medical care and personal health behaviours, such as smoking and eating patterns.... The weight of the evidence suggests that the SDOH have a direct impact on the health of individuals and populations, are the best predictors of individual and population health, structure lifestyle choices, and interact with each other to produce health. (Health Canada, 2002).

Oil and gas development (both onshore and offshore) has become a dominant socioeconomic force on the North Slope. Direct and indirect influences of development are experienced through, for example, the influx of people from a different culture entering previously isolated Inupiat villages; stress over perceived and actual threats to culture and subsistence; direct and indirect employment opportunities; and broad economic and infrastructure improvements. Effects on the SDH may create concomitant positive and negative effects on health status. For example, a local increase in employment may create both benefits through economic opportunity and adverse effects because of tensions between the imperative to provide for one's family through subsistence activities and the pressure to be a successful wage earner. Effects on SDH from Sale 193 natural gas development and production would be greatest during development activities and then return to pre-gas development activities during the gas production pause.

Conclusions

No major adverse impacts are expected for Alaska Inupiat Natives, the only significant "minority" group within the action area. However, one can expect several forms of minor impacts related to potential effects on subsistence resources and practices, human health, and perhaps sociocultural systems. Also, disproportionately high and adverse impacts to this group could occur in the unlikely event of a large oil spill.

IV.D. Unavoidable Adverse Effects

Below is a list of resource areas that could experience unavoidable adverse effects under all of the action alternatives, with notable types of impacts in parentheses:

- water quality (various impacts associated with normal operations and accidents)
- air quality (small, localized impacts via normal operations)
- lower trophic-level organisms (small, localized impacts via construction)
- fish resources (disturbance and localized impacts to habitat)
- Essential Fish Habitat (localized impacts from construction)
- Threatened and Endangered marine mammals (noise and disturbance)
- Threatened and Endangered marine and coastal birds (disturbance)
- marine and coastal birds (disturbance)
- other marine mammals (noise and disturbance)
- terrestrial mammals (disturbance)
- vegetation and wetlands (localized construction-related impacts)
- subsistence-harvest patterns (disturbance)
- sociocultural systems (various impacts from onshore and offshore infrastructure)
- archeological resources (ground and seafloor-disturbing activities)
- land use plans and coastal management programs (construction)
- environmental justice (noise and general disturbance)

The natural gas development scenario would merely extend the viable life of existing plays and infrastructure and build new facilities within previously disturbed areas. Overall, natural gas production and development would not pose any new types of impacts (short- or long-term) in addition to those posed by preceding oil activities.

IV.E. Relationship Between Local-Short-Term Uses and Maintenance and Enhancement of Long Term Productivity

The 193 FEIS found that oil exploration, development and production activities would entail some potential for long-term impacts to nearly all resource areas. However, in each case the potential for impacts to long-term productivity is solely derived from the risk of a large-scale oil spill. (The one exception to this trend regarded archeological resources. The destruction of archeological sites and/or unauthorized removal of artifacts could occur via normal oil exploration, development and production activities, and would represent an inherently long-term loss.) In this SEIS, the natural gas development and production scenario does not entail a risk for a large oil spill. Nor does any component of the gas scenario pose new types of impacts that could adversely affect long-term productivity. None of the potential adverse impacts associated with the gas scenario (except of course for potential impacts to archeological resources associated with ground and seafloor disturbance) would be permanent or persist past several generations.

IV.F. Irreversible and Irretrievable Commitment of Resources

The natural gas development and production scenario would not entail any irreversible and irretrievable commitment of resources.

Chapter V. Cumulative Effects

V.A. Introduction

The following sections summarize the cumulative effects analysis from the 193 FEIS, which is incorporated by reference. The analysis considers the potential effects of past, present, and reasonably foreseeable activities that may affect the same resources that may be affected by the Proposed Action. The summaries include a qualitative assessment of the incremental contribution of the Proposed Action to the overall cumulative effects on each resource. The incremental contribution to cumulative effects from natural gas development and production activities evaluated in this SEIS has been added to the cumulative impact summary for each resource. For a more detailed discussion of the past, present, reasonably foreseeable, and speculative activities of the Chukchi Sea area and the approach to the cumulative effects analysis, readers should reference Section V of the 193 FEIS.

V.A.1. Structure of the Analysis

The cumulative effects analysis in the 193 FEIS comprised a 5-step process:

We identified the potential effects resulting from Sale 193 on the natural resources and human environment that may occur in the Chukchi Sea and the adjacent offshore and onshore areas.

We identified other past, present, and reasonably foreseeable future oil development activity on the North Slope and adjacent offshore areas and considered their effects on the natural resources and human environment potentially affected by Sale 193. Speculative activities were identified, but discussed in a more general way.

- a. Past oil and gas activities development and production considered in the cumulative analysis were those that resulted in currently existing infrastructure.
- b. Present oil and gas activities development and production considered in the cumulative analysis were those for which new facilities are under construction.
- c. Reasonably foreseeable oil and gas activities considered in the cumulative analysis included exploration for undiscovered resources onshore and offshore that could occur during the next 20 years, and development and production of discovered resources that are likely to occur in the next 20 years. Reasonably foreseeable activities include continued operation of the TAPS and tanker shipments of oil to markets in the Pacific Basin.
- d. Speculative oil and gas activities are those activities that may occur beyond 20 years from the present time or not at all.

We considered effects from other actions on these same natural resources and human environments. We considered Federal OCS activities in the Beaufort and Chukchi Sea program areas as well as BLM's continuing program of leasing in the NPR-A. It is reasonable to assume that exploration activities will continue in these Federal areas. There is no infrastructure in NPR-A at the present time, so a new large-diameter gathering line would have to be constructed from the Chukchi Sea coast to the Prudhoe Bay area. We considered the State of Alaska oil- and gas-leasing plans. The State develops 10-year leasing plans and publishes a schedule every other year. All of the North Slope and Beaufort Sea commercially producible crude oil is on State leases except for a portion of the Northstar field that is in the Federal OCS. Activities other than those associated with oil and gas that may affect the environmental and sociocultural resources affected by the Proposed Action included sport and subsistence hunting and fishing, scientific surveys, and marine transportation. We did not attempt to estimate future military activities affecting this region.

We also considered Arctic warming, which could contribute to cumulative effects through, among other things:

- increased noise and disturbance related to increased shipping;
- decreases in ice cover with the potential for resultant changes in prey-species concentrations and distribution with related changes in species distributions; changes in subsistence-hunting practices; and
- northern expansion of species.

We attempted to quantify effects by estimating the extent of the effects (for example, number of animals and habitat affected) and how long the effects would last (for example, population recovery time).

We weighed more heavily the activities that are more certain, closer in time, and closer geographically to the proposed lease sale to keep the cumulative-effects analysis concentrated on the effects that are in the Sale 193 area.

The changes in incremental contributions to cumulative effects under Alternatives III and IV were not evaluated in the 193 FEIS. The extended geographic scale and timeframe of the cumulative analysis reduces the sensitivity of this analysis and treatment of alternatives. Projecting future impacts on the resource further reduces the ability to detect a measurable change between the alternatives. Natural gas development and production activities would be largely identical under the action alternatives analyzed in the 193 FEIS (Alternatives I, III, and IV). Differences in potential effects that may result from the deferral areas built into Alternatives II and IV are negligible.

V.A.2. General Conclusions

The bullets below summarize the general conclusions of the cumulative analysis in the 193 FEIS.

- Potential cumulative effects on the bowhead whale, subsistence, sociocultural systems, spectacled eider, polar bear, and caribou would be of primary concern and warrant continued close attention and effective mitigation practices.
- The Chukchi Sea is a frontier area; therefore, any impacts from Sale 193 would be the primary contributor to any OCS Program impacts.
- We conclude that no significant cumulative impacts would result from routine activities associated the Proposed Action or alternatives.
- In the event of a large offshore oil spill, biological resources may be present in the area but may not necessarily be contacted by the oil. If contacted by oil, significant adverse impacts could occur to biological resources and sociocultural systems. Some significant adverse impacts could occur to spectacled eiders, long-tailed ducks, common eiders, polar bears. Most biological resources contacted by oil are expected to recover within two to three generations.
- In the event of a large offshore oil spill, significant adverse impacts could occur to sociocultural systems. An oil spill could affect the availability of bowhead whales or other subsistence resources, or a resource might be considered tainted and unusable as a food source.
- In the event of a large offshore oil spill, significant adverse Environmental Justice effects could occur in the Inupiat communities of Barrow, Wainwright, Point Hope, Point Lay, and Kivalina, within the North Slope Borough. If a large spill occurred and contaminated essential whaling areas, major effects could occur when impacts from contamination of the shoreline, tainting concerns, cleanup disturbance, and disruption of subsistence practices are

V.B. Analysis of Cumulative Effects

Natural gas development (installation of a pipeline, to shore, expansion of platform and shore facilities, and construction of a pipeline across NPR-A) and production are expected to be similar to the same activities for the earlier oil development and production. Development and production are the later phases of activities that may occur as a result of Sale 193. The effects of the installation of a natural gas pipeline to shore would be the same as those from the installation of the oil pipeline to shore. The effects of expansion of the platform and shore facilities are expected to be less than the effects of the original installations and construction because of the small scope of activity. The effects related to construction of a natural gas pipeline across NPR-A are expected to be less than those for installation of the oil pipeline across NPR-A because the access road would already exist. Therefore, the incremental contribution of natural gas production to cumulative effects would be considerably smaller than the incremental contribution of Sale 193 as analyzed in the 193 FEIS. Leasing, exploration, and oil and gas development and production would represent only a small percentage of the foreseeable cumulative activities. The incremental contribution of the proposed action with natural gas development and production would be slightly greater than the incremental contribution of the proposed action without natural gas development and production. The incremental contribution of Sale 193 exploration, development, and production activities, including natural gas development and production, to overall cumulative effects would remain minor, absent a large oil spill.

V.B.1. Water Quality

Current industrial impacts to water quality in the Chukchi Sea are minimal and degradation of the water quality is confined almost exclusively to external intrusions and naturally occurring processes. Future anthropogenic impacts to water quality primarily would be caused by discharge of pollution into the marine waters from source and nonsource discharges. Polluted discharge from marine vessel traffic, especially from large vessels such as large cruise ships, oil spills, and discharges from exploration, development, and production activities could cause degradation of the marine environment.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

Activities from Sale 193 may cause small, localized increases in the concentrations of pollutants to water quality. These contaminants are considered to be temporary in nature, precipitating over a small period of time after the discharges cease. Effects on local water quality are expected to be low, while regional effects are expected to be very low. Sustained degradation of water quality to contamination levels above State and Federal criteria is unlikely. Compliant postlease activities do not pose a significant degree of risk to water quality. A large oil spill would be an accidental event with possible significant impacts. The projected exploration and development from the Proposed Action would represent only a small percentage of the foreseeable cumulative activities; the contribution of the proposed action is not expected to change the level of overall cumulative effects.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a negligible increment to the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on water quality is expected to be negligible.

V.B.2. Air Quality

In the Alaska Arctic, Prudhoe Bay and Kuparuk River fields are the principal oil- and gas-producing fields. Air monitoring at a number of sites in the Kuparuk and Prudhoe Bay fields showed that concentrations of nitrogen dioxide, sulfur dioxide, and PM₁₀ (particulate matter less than 10 microns in diameter) are well within the National Ambient Air Quality Standards (NAAQS). BPXA's air quality modeling for the Liberty Project indicated that emissions from the Prudhoe Bay and Kuparuk fields have very little effect on ambient concentrations elsewhere. The air quality modeling for Liberty indicated that maximum concentrations would occur within about 100-200 meters (m) from the facility boundary and would be considerably lower at 1 kilometer (km) from the facility. It is likely that new development would be relatively scattered on the North Slope and, therefore, regional impacts would be small, except for higher, localized concentrations in the immediate vicinity of production facilities. Based on this information, very little, if any, cumulative interaction between emissions from Sale 193 activities and other oil and gas facilities is expected.

All activities in the Chukchi Sea, Beaufort Sea, and North Slope areas of Alaska in the past and occurring now have caused generally little deterioration in air quality, which remains better than required by national standards. All reasonably foreseeable North Slope area activities are not expected to change this.

Arctic haze resulting from elevated concentrations of fine particulate matter occurs primarily in winter and spring. Most of these pollutants are attributed to combustion sources in Europe and Asia.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

Emissions associated with routine program activities could cause small increases in onshore concentrations of some air pollutants. Emissions should not cause any exceedance of national or State air quality standards. In the event of a large oil spill, the concentrations of volatile organic carbons would increase rapidly near the spill site, but concentrations would dissipate rapidly and would be much reduced after the first day and would not cause major impacts.

Sale 193 activities would represent only a small percentage of the existing North Slope activity. Production from Sale 193 is likely to offset declining production elsewhere. Emissions from Sale 193 activities would have no significant cumulative effects on air quality.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a negligible increment to the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on air quality is expected to be negligible.

V.B.3. Lower Trophic-level Organisms

Climate change and the decreases in the summer ice cover will probably have the greatest measurable effects on these organisms in the Chukchi Sea.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

Offshore production-platform construction, trench dredging, and pipeline burial are expected to affect some benthic organisms within 1 km for less than 1 year or season. The cumulative level of effect on lower trophic-level organisms with standard mitigation would be locally moderate. Contributions resulting from the proposed action are not expected to change the overall cumulative effects on lower trophic-level organisms.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a negligible increment to the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on lower trophic-level organisms is expected to be negligible.

V.B.4. Fish Resources

Subsistence fishing, coastwise and maritime traffic, and any discharges from local communities have the potential for local impacts on fish resources. There is no commercial fishing in the Sale 193 area and little recreational fishing. The environmental changes associated with Arctic climate change have the greatest potential to impact fish resources in the Chukchi Sea region.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

Contributions resulting from the proposed action are not expected to change the overall cumulative effects on fish resources.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a negligible increment to the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on fish resources is expected to be negligible.

V.B.5. Essential Fish Habitat

Subsistence fishing, coastwise and maritime traffic, and discharges from local communities have the potential for local impacts on EFH. The environmental changes associated with Arctic climate change have the greatest potential to impact EFH in the Chukchi Sea region.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

Contributions resulting from the proposed action are not expected to change the overall cumulative effects on EFH.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a negligible increment to the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on EFH is expected to be negligible.

V.B.6. Threatened and Endangered Species**Threatened and Endangered Marine Mammals**

The following types of cumulative factors could contribute to potential cumulative effects on whales found in the Chukchi Sea Planning Area:

- subsistence hunting
- activities related to offshore oil and gas exploration and development
- marine vessel traffic
- research activities
- climate change
- pollution and contaminants

Available evidence indicates that subsistence hunting causes disturbance to whales, changes in their behavior, and sometimes temporary effects on habitat use, including migration paths.

Bowhead and other whales avoid various industrial activities if the received sound levels associated with the activity are sufficiently strong (Richardson et al., 1995a; NRC, 2003).

Effects of a large oil spill in Federal or State waters would most likely result in nonlethal temporary or permanent effects to bowhead, fin, or humpback whales. It is unlikely that the availability of food resources for whales would be affected.

The main impacts of climate change on ESA-listed whales would be related to habitat changes that might impact migratory routes and breeding, prey availability, or feeding grounds.

Bowhead Whales.

Incidental take of bowhead whales apparently has occurred only rarely as a result of commercial fishing, marine vessel traffic, and research activities.

The take of bowhead whales by indigenous hunters represents the largest known human-related cause of mortality in this population at the present time, and it is likely to remain so for the foreseeable future. The subsistence take, while additive, is small as compared to the capacity of the population to absorb it and to thrive.

Available data indicates that noise and disturbance from oil and gas exploration and development activities since the mid-1970's have had localized, short-term adverse effects and no lasting population-level adverse effect on bowhead whales. There is no indication that human activities (other than historic commercial whaling) have caused long-term displacement in bowheads.

Oil and gas exploration activities, especially during the 1990's and early 2000's have been shaped by various mitigating measures and related requirements for monitoring. Mitigation measures imposed through the MMPA authorizations process are designed to avoid Level A Harassment (injury), reduce the potential for population-level significant adverse effects on bowhead whales, and avoid an unmitigable adverse impact on their availability for subsistence purposes. Such mitigating measures, with monitoring requirements, were designed to, and probably did, reduce the impact on the whales and on potential impacts on whale availability to subsistence hunters. We assume future activities in Federal OCS waters will have similar levels of protective measures.

Offshore exploration seismic surveys are likely to result in some incremental cumulative effects to bowhead whales through the potential exclusion or avoidance of whales from feeding or resting areas and disruption of important associated biological behaviors. Analysis of the likely range of effects and the likelihood of exposures resulting in adverse behavioral effects supports a conclusion that the activities would result in no more than temporary adverse effects and less than stock-level effects. Seismic surveys, especially as mitigated under MMPA authorizations, are not expected to add significantly to the cumulative impacts on bowhead whales from past, present, and future activities.

The ice-associated bowhead may be particularly susceptible to any diminishment or variation in sea ice cover associated with climate change. Potential impacts may result from an increase in vessel traffic, an increase in killer whale predation, changes to hunting dynamics, and other factors.

Fin Whales

Documented human-caused mortality of fin whales in the North Pacific since the cessation of commercial whaling is low. There is no evidence of subsistence take of fin whales in the Northeast Pacific (Angliss, DeMaster, and Lopez, 2001; Angliss and Lodge, 2002). Documented fishery interaction rates with fin whales are low in the North Pacific. Reported instances of fin whale deaths due to vessel strikes are low.

Humpback Whales

The NMFS (1991) reports that entrapment and entanglement in active fishing gear (O'Hara, Atkins, Ludicello, 1986) is the most frequently identified source of human-caused injury or mortality to

humpback whales and it has been documented to have occurred in Alaska (von Zeigesar, 1984 cited in von Zeigesar, Miller, and Dahlheim, 1994). Angliss and Lodge (2003:157) gives a total of 34 humpbacks from the Central North Pacific Stock classified as being involved in a human-related stranding or entanglement between 1997 and 2001. The Alaska Scientific Review Group (2001) stated that 32 humpbacks were entangled in southeast Alaska in the previous five-year period. The NMFS (1991a) also lists noise and disturbance from whale-watching boats; industrial activities; and ships, boats, and aircraft as causes of concern for humpback whales. Vessel collision also is of concern for humpbacks. Perry, DeMaster, and Silber (1999b) summarized that humpbacks respond the most to moving sound sources (e.g., fishing vessels, low-flying aircraft) and the long-term displacement of humpbacks from Glacier Bay and parts of Hawaii may have occurred due to vessel-noise disturbance. Perry, DeMaster, and Silber (1999b) reported that continued development of coasts and oil exploitation and drilling may lead to humpbacks avoidance of areas.

Polar Bears

The main impacting factors of concern to polar bears (now listed as threatened under the ESA) are climate change, overharvest, and oil and fuel spills. Leads and polynas are critical habitat for polar bears, especially during winter and spring, and increasing shipping traffic could disturb polar bears during these critical times (USDOI, FWS, 1995). Changes in the extent and concentration of sea ice may alter the distributions, ranges, nutritional status, reproductive success, and ultimately the abundance and stock structure of polar bears.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

The Proposed Action is likely to result in a negligible contribution to effects on bowhead, fin and humpback whales. There is the possibility of exclusion or avoidance from feeding or resting areas and possible disruption of important biological behaviors. The incremental contribution of the Proposed Action to cumulative effects on polar bears (now listed as threatened under the ESA) is expected to be minor, except for potential significant effects in the event of a large oil spill.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a small percentage of the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on ESA-listed marine mammals is expected to be negligible.

Threatened and Endangered Birds

The cumulative effects of the Proposed Action on threatened and endangered birds and designated critical habitat are evaluated in the Biological Evaluation prepared to meet responsibilities under the ESA.

Cumulative effects to spectacled and Steller's eiders and Kittlitz's murrelets would be similar to those identified for similar marine and coastal bird species (below), except that the significance thresholds are different. If spectacled and Steller's eider populations continue to decline, any future losses would not be recovered within a generation and would be consider a significant impact.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

The FWS BO concluded that 3 adult spectacled eiders and 1 adult Steller's eider may be incidentally taken through collisions with structures during activities authorized during leasing and exploration activities resulting from Sale 193. There is no authorized incidental take associated with oil spills as they are considered an unlawful activity. If spectacled and Steller's eider populations continue to decline, any spectacled and Steller's eider mortality associated with an oil spill would be a significant impact.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a small percentage of the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on ESA-listed birds is expected to be negligible.

V.B.7. Marine and Coastal Birds

Subsistence hunting, coastwise and maritime traffic, and any discharges from local communities have the potential for local impacts on marine and coastal birds. The environmental changes associated with Arctic climate change have the potential to impact marine and coastal birds in the Chukchi Sea region.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

OCS seismic survey activities will not be allowed in the Ledyard By area after July 1 of each year and aircraft are required to remain 1,500 ft above the area or use designated routes during poor weather. Because of these measures, the cumulative effect of seismic exploration on marine and coastal birds probably would be minimal, particularly to birds staging or molting in the Ledyard Bay area. The cumulative effect of disturbance due to seafloor sampling and drilling platforms is expected to be minor. Construction of pipelines for offshore development would impact several hundreds of acres of bird molting and foraging habitat and would be a major, but short-term, impact that would result in the displacement of staging and molting birds from nearshore areas.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a small percentage of the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on marine and coastal birds is expected to be negligible.

V.B.8. Other Marine Mammals

Increasing human activity, industrial development, oil and gas activities, and anthropogenic and natural contaminants levels in the Arctic may be affecting marine mammal populations. Large-volume fish removals in the Bering Sea may also be having adverse effect on marine mammals that occur in the Arctic.

The main impacts of climate change on marine mammals would result from habitat changes (e.g., ice melting) that might impact prey migration, location, or availability as well as potentially impacting existing migratory routes and breeding or feeding grounds. For marine mammals adapted to life with sea ice, the effects of reductions in sea ice are likely to be reflected initially by shifts in range and abundance (Tynan and DeMaster, 1997), particularly for seals, gray whales, and walrus. Changes in the extent and concentration of sea ice may alter the seasonal distributions, geographic ranges, patterns of migration, nutritional status, reproductive success, and ultimately the abundance and stock structure of some species.

Some marine mammals may benefit from arctic climate change. For example, sightings data of gray whale calves suggest that higher calf counts in the spring are associated with years of delayed onset of freezeup in the Chukchi Sea.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

The incremental contribution of the Proposed Action to cumulative effects on marine mammals not listed under the ESA is expected to be minor, except for potential major effects in the event of a large oil spill.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a small percentage of the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on marine mammals not listed under the ESA is expected to be negligible.

V.B.9. Terrestrial Mammals

Subsistence take, recreational hunting, and the environmental changes associated with Arctic climate change have the potential to impact terrestrial mammals to varying degrees. Industrial activities that could affect terrestrial mammals include:

- Oil and gas development in NPR-A.
- Road Construction on the North Slope.
- Coal development in the Brooks Range.
- Expansion of Red Dog Mine.
- Development of bornite mining in the Ambler Mining District.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

The incremental contribution of the Proposed Action to cumulative effects on terrestrial mammals is expected to be negligible to minor.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a small percentage of the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on terrestrial mammals is expected to be negligible.

V.B.10. Vegetation and Wetlands

A 2001 evaluation of cumulative impacts on the North Slope indicates that impacts on vegetation at present include approximately 17,324 acres of tundra and floodplains covered due to gravel road, gravel pads, and gravel mining (NRC, 2003b). Gravel roads and gravel pads represent more than 8,800 acres and gravel mines nearly 6,400 acres of the impacted area. The indirect effects associated with existing roads, roadside flooding, dust-killed tundra, and thermokarst were estimated to cover at least 10,500 acres (NRC, 2003b). The total affected acreage is a small part of the ACP, and cumulative effects probably are not significant to the overall productivity of tundra plants. Impacts on vegetation could accumulate and persist, especially if the structures remain once industrial activity has ceased. Rehabilitation of gravel pads can result in the growth of grasses-sedges within 2 years after abandonment of the pads, but the natural growth of plant cover on abandoned gravel pads would be very low. The local additive effects of gravel pads and roads, borrow sites, and other infrastructure would be expected to persist decades after the oil fields are abandoned.

Changes in vegetation from dust and snowdrift accumulation or the formation and draining of impoundments related to roads and gravel pads are not be considered permanent. Typically, permafrost-related geomorphic processes occurring in the North Slope create a constantly changing landscape that influences succession patterns in plant communities, so they are adapted to such frequent changes.

In terms of acres of land affected, construction of onshore infrastructure would cause more than 99% of the effects. Cumulative effects of small oil spills and other discharges are expected to be localized. Small spills occurring on snow are expected to have few cumulative effects, as they are usually cleaned up immediately upon discovery and usually are successfully removed before reaching the vegetation root mat.

The environmental changes associated with Arctic climate change have the greatest potential to impact vegetation and wetlands on the North Slope.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

A large-diameter oil pipeline is assumed to be constructed from the Chukchi Sea coast across NPR-A. The overland oil pipeline(s) would be elevated above ground and pump stations would be needed at about 100-mi intervals. Assuming that the pipeline would create an eastward corridor of about 100 ft wide and 300 mi long, the approximate area to be impacted would be approximately 1,470 hectares (3636 acres). This represents <1% of the area covered by vegetation and wetlands of the North Slope. A pump station is foreseen to be constructed on gravel pads at about 100 mi from each other along the pipeline corridor, for a likely maximum of three to four pump stations. The burial of vegetation under gravel pads could be considered a permanent loss (25 and 30 years) of the affected plant communities.

Impacts to vegetation of Alaska's North Slope from oil and gas exploration and development in the Chukchi Sea are expected to be a fraction of the total North Slope acreage. It is not expected that synergistic impacts to vegetation would occur by affecting additional acres, or would any effects (whether beneficial or countervailing) occur to vegetation as a result of additional acres developed.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Effects of natural gas development and production would represent only a small percentage of the effects from the Sale 193. The incremental contribution of natural gas development and production to cumulative effects on vegetation and wetlands is expected to be negligible.

V.B.11. Economy

Without the development of future onshore and offshore oil and gas development projects, the onshore and offshore oil industry in and near Prudhoe Bay is expected to decline, and the associated direct employment would be expected to decline. Associated indirect employment in Southcentral Alaska, Fairbanks, and the NSB and revenues to the Federal, State, and NSB governments would be expected to decline also.

The Trans Alaska Pipeline System (TAPS) represents a tremendous capital investment. Additional onshore and offshore oil development and production is necessary to extend the useful life of TAPS. In January 8, 2003, the TAPS Right-of-Way was renewed for another 30 years by both State and Federal agencies.

The Northeast and Northwest portion of the NPR-A are projected to generate considerable revenues in the future. Future revenues are also expected from continuing production from Prudhoe Bay and reasonably foreseeable Prudhoe Bay development.

In the 193 FEIS, cumulative oil and gas activities (past, present, and reasonable foreseeable development and production, both onshore and offshore, both State and Federal) is projected to generate annual revenues of \$32 million to the NSB, \$232 million to the State, and \$1.1 billion to the Federal Government.

Cumulative gains in direct employment in the oil and gas industry would generate indirect and induced employment and associated personal income. Indirect and induced employment is generated by expenditure for goods and services used on the North Slope and spending by direct employees.

Contribution of 193 FEIS Alternative I to Cumulative Impacts

The Proposed Action is expected to have beneficial effects on the economies of the NSB, State of Alaska, and the Federal Government through the creation of direct, indirect, and induced employment and the generation of revenues. No royalties would flow to the State from Sale 193 oil production.

Oil production from Sale 193 leases would contribute to extending the useful life of TAPS.

The incremental contribution of the Proposed Action is expected to make a substantial incremental contribution to the NSB economy, a minor contribution to Alaska State economy, and a negligible contribution to National economy.

Contribution of Gas Production to Cumulative Impacts

Natural gas development and production would generate employment and revenues comparable to those generated by oil development and production resulting from Sale 193. No royalties would flow to the State from Sale 193 natural gas production.

Natural gas from Sale 193 leases would contribute to extending the useful life of a large capacity North Slope gas pipeline to outside markets.

Natural gas development and production is expected to have beneficial effects on the economy of the NSB, State of Alaska, and the Federal Government. The incremental contribution of natural gas development and production is expected to make a substantial incremental contribution to NSB economy, a minor contribution to Alaska State economy, and a negligible contribution to National economy.

V.B.12. Subsistence-Harvest Patterns

The NSB's written scoping comments and recommendations on the BLM's Northeast NPR-A IAP EIS in April 1997, articulated concerns about the cumulative impacts of all industrial and human activities on the North Slope and its residents. Consideration of these impacts must take into account industrial activities occurring offshore and at existing oil fields to the east; scientific research efforts; sport hunting and recreational uses of lands; and the enforcement of regulations governing the harvest of fish and wildlife resources by local residents. (NSB, 1997; USDOl, MMS, 2003a)

Onshore activities that could affect subsistence-harvest patterns include noise and traffic disturbance, disturbance from construction activities associated with ice roads, production facilities, pipelines, gravel mining, supply efforts, and potential oil spills. Adverse effects could include resource displacement; changes in hunter access to resources; increased competition; contamination levels in subsistence resources; harvest reductions; or increased effort, risk, and cost to hunters. Oil on the North Slope already has caused increased regulation of subsistence hunting, reduced access to hunting and fishing areas, altered habitat, and intensified competition from nonsubsistence hunters for fish and wildlife (Haynes and Pedersen, 1989; Pedersen et al., 2000; Miller, 2001).

Access to subsistence resources and subsistence-hunting areas and the use of subsistence resources could change if cumulative noise and traffic disturbance reduces the availability of resources or alters distribution patterns. Subsistence-harvest activities could be disrupted occasionally by vessel and air traffic. If increased noise affected whales and caused them to deflect from their normal migration route, they could be displaced from traditional hunting areas, and the traditional bowhead whale harvest could be adversely affected by requiring boat crews to longer times or distances for hunts. Because the bowhead whale harvest in all communities except Barrow tends to be quite small—one to two whales per year—noise disturbance from icebreakers and other vessels could cause this small harvest to become locally unavailable for an entire season. Increased air traffic and vessel activities in the Chukchi Sea could impact the beluga harvest by causing beluga whales to become locally unavailable for certain critical periods. Required protective mitigation is expected to reduce these noise disturbance impacts.

Development of regional roads would have the potential to negatively affect wildlife and subsistence patterns through habitat fragmentation, increased access into wildlife habitats, increased disturbance impacts, increased potential for mortality (road kills), possible alteration of behavior or movement patterns of wildlife, increased competition for subsistence resources, and possibly an increase in

tourist traffic and recreational use of the area. Increased access to terrestrial mammals could increase hunting pressure and increase competition for subsistence resources from both subsistence and nonsubsistence hunters. Increased harvest levels potentially could make game scarcer near the roads. Reduced abundance and distribution of terrestrial mammals would be expected along the road corridor from hunting, trapping, recreation, and tourist traffic. As a result subsistence hunts could take longer as hunters would have to travel farther from the road corridor to successfully reach game or be forced to hunt in nontraditional areas

Because polar marine and terrestrial animal populations would be particularly vulnerable to changes in sea ice, snow cover, and alterations in habitat and food sources brought on by climate change, rapid and long-term impacts on subsistence resources (availability), subsistence-harvest practices (travel modes and conditions, traditional access routes, traditional seasons and harvest locations), and the traditional diet would be expected (IPCC, 2001b; NRC, 2003b; ACIA, 2004; Millennium Ecosystems Assessment, 2005; United Nations Environment Programme, 2005; Callaway, 2007).

Contribution of 193 FEIS Alternative I to Cumulative Impacts

Oil and gas development in the Chukchi Sea Planning Area could inhibit subsistence harvesters' use of traditional harvest areas, which could reduce harvest success; increase the cost, effort, and risk involved with subsistence harvest; increase the wear and tear on equipment used for harvesting subsistence foods; devalue elders' knowledge of the traditional landscape; increase the importance of local knowledge of oil industry schedules and practices; and reduce the enjoyment of eating traditional foods, should harvests be reduced or perceptions of contamination of subsistence resources arise. The use of marine subsistence resources could change, if oil development reduces the availability or alters distribution patterns subsistence species. The most serious concern to Inupiat subsistence users is that potential increases in noise from OCS development could disrupt the normal migration of bowhead whales, forcing subsistence whalers into longer hunts farther from shore. The communities of Barrow, Wainwright, Point Lay, Point Hope, and Kivalina would be potentially affected, with Wainwright potentially being the most affected community because of potential impacts from shore-base-facility construction.

A road associated with an oil-sales pipeline across NPR-A would provide new access to subsistence-hunting areas and subsistence resources and subsequent concerns about increased hunting pressure and increased competition for subsistence resources from both subsistence and nonsubsistence hunters. The pipeline across NPR-A could promote the development and expansion of the oil and gas development in NPR-A and possible hunter access restrictions, hunting area reductions, trespass issues, and disturbance and displacement of game.

In the event that a large oil spill occurred and contaminated essential whaling areas, significant additive effects to subsistence-harvest could occur from contamination of the shoreline, tainting concerns, cleanup disturbance, and disruption of subsistence practices.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Natural gas development and production would represent only a small percentage of the effects of the Sale. The incremental contribution of natural gas development and production to cumulative effects on subsistence-harvest practices is expected to be negligible.

V.B.13. Sociocultural Systems

It is important to note the difficulty in disaggregating the contribution of various factors to cumulative effects on the sociocultural systems of the North Slope communities. Many events (including ANCSA and ANILCA legislation, and the formation of the NSB, the AEWC, and other local and regional institutions) have combined with the area's oil development to bring rapid social change to the area. On the regional level, cumulative effects from oil and gas development and other activities

would have direct and indirect consequences on social organization, cultural practices and institutional organization but would not tend to displace social systems.

Contribution of Alternative I to Cumulative Impacts

The effects of Sale 193 on sociocultural systems are largely the same as overall cumulative effects, except that effects of onshore support facilities are likely to be focused in Wainwright. The Proposed Action would represent a small percentage of the foreseeable cumulative activities.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Natural gas development and production would represent only a negligible increment to the effects from Sale 193. The incremental contribution of natural gas development and production to cumulative effects on sociocultural systems is expected to be negligible.

V.B.14. Archaeological Resources

The greatest cumulative effect on archaeological resources in Chukchi Sea area is from natural processes such as ice gouging, bottom scour, thermokarst erosion, and shoreline erosion. Because the destructive effects of natural processes are cumulative, they have affected and will continue to affect archaeological resources in this area.

In addition to Alternative I for Sale 193, other activities associated with this cumulative analysis that may affect archaeological resources in the Chukchi Sea include lease sales and activity in the Beaufort Sea and the NPR-A and State lands, State oil and gas fields, oil and gas transportation, noncrude carriers, and any Federal activities. Cumulatively, these proposed projects likely would disturb the seafloor, but remote-sensing surveys made before approval of any Federal or State lease actions should keep these effects low. Federal laws would preclude effects to most archaeological resources from these planned activities.

Contribution of Alternative I to Cumulative Effects

The incremental contribution of the Proposed Action to the cumulative impacts on both prehistoric and historic archaeological resources should be negligible. Any surface-disturbing activities that could damage archaeological sites would be mitigated by current State and Federal procedures, which require identification and mitigation of archaeological resources in the proposed project areas.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Gas development and production would represent only a small percentage of the effects of the Sale. The incremental contribution of natural gas development and production to cumulative effects on archaeological resources is expected to be negligible.

V.B.15. Environmental Justice

Activities on the North Slope and in the adjacent Chukchi and Beaufort seas may affect subsistence resources and harvest practices. Environmental Justice effects on Inupiat Natives and the Inupiat communities of Barrow, Wainwright, Point Lay, and Point Hope could occur because of their reliance on subsistence foods. Onshore oil and gas development, especially potential road development within NPR-A and Alpine satellite field expansion, could impact subsistence resources and harvest practices. Subsistence resources, particularly caribou, could experience long-term disturbance and displacement effects, as well as functional loss of habitat and potential population reductions, causing subsistence hunters to alter traditional harvest practices by having to travel to unfamiliar areas. If this occurred, long-term displacement of ongoing social systems would be expected. Community activities and traditional practices for harvesting, sharing, and processing subsistence resources would be altered, and disproportionate, high, adverse effects would be expected for the Inupiat communities of Barrow, Wainwright, Point Lay, and possibly Point Hope.

Cumulative effects on human health would derive from impacts to subsistence, degradation of air and water quality, contaminants in subsistence foods, and sociocultural effects. Long-term climate change effects on marine and terrestrial ecosystems in the Arctic—affecting subsistence resources, traditional culture, and community infrastructure of subsistence-based indigenous communities in the NSB—would be a contribution factor to cumulative environmental justice impacts. Potential disproportionately high adverse effects on low-income, minority populations in the region effects are expected to be mitigated substantially, but not eliminated.

Contribution of Alternative I to Cumulative Impacts

In-place protective measures, stipulated measures for seismic-survey permits, and mitigation accompanying NMFS IHA authorizations are expected to mitigate effects so that no unmitigable adverse effects to subsistence-harvest patterns, resources, or practices and any consequent impacts on sociocultural systems would occur from noise and disturbance. Major effects are not expected from routine activities and operations; however, if a large oil spill occurred and contaminated essential whaling areas, major effects could occur when impacts from contamination of the shoreline, tainting concerns, cleanup disturbance, and disruption of subsistence practices are factored together. Only in the event of a large oil spill would disproportionate high adverse effects be expected on Alaskan Natives.

Section V.C.15 of the 193 FEIS provides a discussion of the initiatives and studies BOEM, other Federal, State, and NSB agencies have undertaken to address Environmental Justice issues on the North Slope.

Contribution of Natural Gas Development and Production to Cumulative Impacts

Gas development and production would represent only a small percentage of the effects of the Sale. The incremental contribution of natural gas development and production to cumulative effects on Environmental Justice issues is expected to be negligible.

Chapter VI. Consultation and Coordination

VI.A. Development of the Proposed Action, DEIS, and FEIS.

In 2002, the Secretary of the Interior issued the Final OCS Oil and Gas Leasing Program for 2002-2007 (2002-2007 5-Year Program). That document presented USDOl's decision to consider annual "special-interest" sales in the Chukchi Sea/Hope Basin OCS Planning Areas. In response to the Call For Information and Nominations published in the *Federal Register* on February 9, 2005 (70 *FR* 6903), industry nominated a substantial portion of the Chukchi Sea Planning Area. The prelease process and EIS could not be completed in time to allow the Sale during the 2002-2007 5-Year Program, which expired on June 30, 2007. Chukchi Sale 193 was subsequently included in the 2007-2012 5-Year Program.

Information on the prelease and NEPA processes for Sale 193 can be found in Sections I.D and VI of the 193 FEIS. *Federal Register* Notices, Scoping Report, Draft and Final Notices of Sale, and other information on Sale 193 is on the BOEM website at :<http://alaska.boemre.gov/cproject/Chukchi193/Chukchiindex.htm>.

VI.B. Development of SEIS

The Draft SEIS and a 45-day public review and comment period will be announced in the *Federal Register*. Public hearings on the Draft SEIS are tentatively planned to be held in Chukchi Sea coastal communities in November 2010.

VI.C. Consultation

The BOEM has engaged in several consultation and coordination processes with fellow regulatory agency in regards to proposed activities under Lease Sale 193. Below is a brief summary of how BOEM has satisfied or will satisfy its requirements under various Federal regulatory processes.

VI.C.1. ESA Section 7

A discussion on the ESA Section 7 consultation related to Sale 193 is provided in Section VI.D of the 193 FEIS.

Section 7(a)(2) of the ESA requires each Federal agency to ensure that any action that they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the adverse modification of designated critical habitat. To satisfy its ESA obligations on proposed lease sales, BOEM consults with FWS and NMFS for listed species under each Service's jurisdiction. For ESA consultation on proposed lease sales, BOEM specifically requests incremental Section 7 consultation. Regulations at 50 CFR 402.14 (k) allow consultation on part of the entire action as long as that step does not violate Section 7(a)(2), that there is a reasonable likelihood that the entire action will not violate Section 7(a)(2), and that the agency continues consultation with respect to the entire action, obtaining a biological opinion for each step. Thus, at the lease-sale stage, BOEM consults on the early lease activities (seismic surveying, ancillary activities, and exploration drilling) to ensure that activities under any leases issued will not result in jeopardy to a listed species or cause adverse modification of designated critical habitat. BOEM is required to reconsult for any proposed development and production activities.

The BOEM's predecessor agency, the MMS, prepared multiple Biological Evaluations (BEs) that evaluate the types of activities contemplated under the Proposed Actions analyzed in the 193 FEIS and this Draft SEIS. In response to various MMS requests to initiate formal consultation, both NMFS and FWS returned multiple Biological Opinions analyzing potential oil and gas exploration, development, and production activities in the Chukchi Sea. Relevant NMFS BOs include the Arctic

Regional BO of 2006 and a 2008 BO for Oil and Gas Leasing and Exploration Activities in the Beaufort and Chukchi Seas. Applicable FWS BOs include the Oil and Gas Sale 193 BO from 2007 as well as the BO for Beaufort and Chukchi Sea Program Area Lease Sales completed in 2009. These documents, along with associated BEs and correspondence documents, are available at the BOEM website at http://alaska.boemre.gov/ref/Biological_opinions_evaluations.htm. As indicated in Table 2 below, BOEM has consulted (or conferred) with the appropriate Service on the Proposed Action's potential impacts to Endangered, Threatened, and Candidate species present within the affected area, as well as regarding potential impacts to designated Critical Habitat. The BOEM would reinstate consultation with FWS if and when Critical Habitat for polar bear is formally designated.

Table 2. Consultation or conference with respect to potential impacts to Endangered, Threatened, and Candidate species present within the affected area.

Species	Listing Status	Critical Habitat	BOEM Obligation	Completed Consultations / Conferences	Additional Requirements for SEIS
Bowhead Whale	Endangered	None	Consultation	NMFS ARBO 2006 NMFS BCS BO 2008	None
Humpback Whale	Endangered	None	Consultation	NMFS BCS BO 2008	None
Fin Whale	Endangered	None	Consultation	NMFS BCS BO 2008	None
Polar Bear	Threatened (as of 5/08)	Proposed	Consultation	FWS BCS BO 2009	(Reinitiation of consultation upon designation of Critical Habitat)
Spectacled Eider	Threatened	Ledyard Bay CH Unit	Consultation	FWS Sale 193 BO 2007 FWS BCS BO 2009	None
Steller's Eider	Threatened	None	Consultation	FWS Sale 193 BO 2007 FWS BCS BO 2009	None
Kittlitz's Murrelet	Candidate	None	Conference	FWS Sale 193 BO 2007 FWS BCS BO 2009	None
Yellow-Billed Loon	Candidate (as of 3/09)	None	Conference	FWS BCS BO 2009	None

Key to Table:

- FWS BCS BO 2009 = Biological Opinion for Beaufort and Chukchi Sea Program Area Lease Sales and associated Seismic Surveys and Exploratory Drilling; Fish & Wildlife Service; September 3, 2009.
- NMFS BCS BO 2008 = Biological Opinion for Oil and Gas Leasing and Exploration Activities in the Beaufort and Chukchi Seas, Alaska; and Authorizations of Small Takes Under the Marine Mammal Protection Act; National Marine Fisheries Service; July 17, 2008.
- FWS Sale 193 BO 2007 = Biological Opinion for Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 and Associated Seismic Surveys and Exploratory Drilling; Fish & Wildlife Service; March 2007.
- NMFS ARBO 2006 = Biological Opinion for Oil & Gas Leasing & Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska, Arctic Regional Biological Opinion; National Marine Fisheries Service; June 16, 2006.

VI.C.2. Essential Fish Habitat Consultation

In 2006, BOEM consulted with NMFS regarding the potential effects to EFH of all five species of Pacific salmon. This process culminated in a document entitled "Chukchi Lease Sale 193 Essential Fish Habitat Consultation". No additional EFH consultation is required for an Pacific salmon as a result of this Supplemental process. More recently, EFH has been designated for Arctic cod, Saffron Cod, and Opilio Crab. Potential effects to these species' respective EFH from various activities proposed for 2010 is the subject of a consultation document entitled "Supplemental EFH Analysis for

Arctic Cod, Saffron Cod & Opilio Crab: Beaufort and Chukchi Sea Planning Areas”. The BOEM is currently assessing whether additional consultation is required for potential effects Sale 193 on Arctic cod, Saffron cod, and Opilio crab EFH. Table 3 (below) summarizes relevant past EFH consultations and identifies where additional consultation may be necessary.

Table 3. Summary of relevant past EFH consultations and additional consultations necessary.

Species	Completed Consultations	Additional Requirements for SEIS
Pacific salmon (5 species)	Chukchi Lease Sale 193 Essential Fish Habitat Consultation; 2006	None for these species
Arctic Cod (EFH designated August 2009)	Supplemental EFH Analysis, 2010 No prior consultation specific to Lease Sale 193 FEIS and SEIS activities	Additional EFH consultation on Arctic cod may be required
Saffron Cod (EFH designated August 2009)	Supplemental EFH Analysis, 2010 No prior consultation specific to Lease Sale 193 FEIS and SEIS activities	Additional EFH consultation on Saffron cod may be required
Opilio crab (EFH designated August 2009)	Supplemental EFH Analysis, 2010 No prior consultation specific to Lease Sale 193 FEIS and SEIS activities	Additional EFH consultation on Opilio crab may be required

VI.C.3. Section 106 Consultation

On January 30, 2007, BOEM initiated Section 106 consultation with the Alaska State Historic Preservation Officer (SHPO) for the proposed Chukchi Sea Oil and Gas Lease Sale 193. The BOEM identified two historic resources (shipwrecks) in the Chukchi Sea Planning Area and identified the specific lease blocks (see 193 FEIS). At the time of the proposed lease-sale EIS, no bottom-disturbing activities were anticipated and BOEM requested the SHPO's concurrence that proposed Lease Sale 193 would have "no effect upon known offshore historic and/or prehistoric resources." Concurrence was received from the SHPO on March 2, 2007. BOEM has subsequently consulted with the Alaska SHPO on two additional actions relevant to the Chukchi Sea Planning Area – the Arctic Multiple-Sale DEIS in 2008 and Shell's ancillary activity notice for marine surveys in the Chukchi Sea in 2010. While no additional Section 106 consultation will be necessary for Sale 193 or this Supplemental EIS process, additional consultations will occur regarding any Exploration Plans or Development & Production Plans which may follow from this sale.

VI.C.4. CZMA Consistency Review

A Consistency Determination (CD) was sent to the State of Alaska in conjunction with the Proposed Notice of Sale in August 2007. The CD analyzed the consistency of Sale 193 with the Alaska Coastal Zone Management (CZM) program. The document evaluated potential effects from the sale action and from hypothetical exploration and development activities outlined in the FEIS analysis. The MMS found that the proposal was consistent to the maximum extent practicable with the state's CZM program, including the enforceable policies of the North Slope Borough's district plan. On October 30, 2007, the State of Alaska issued its final consistency decision concurring with our determination that the sale is consistent to the maximum extent practicable with the Alaska Coastal Management Program and the local district's enforceable policies.

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Appendix A: Analysis of Incomplete or Missing Information

Appendix A provides an analysis of individual statements from the 193 FEIS, that identify incomplete or unavailable information pursuant to 40 CFR 1502.22 (regulation restated below). Although the Sale 193 FEIS is replete with discussion on the strengths and weaknesses of available data, BOEM analysts were generally able to complete thorough analyses and draw informed conclusions from the information available. The following analysis comprehensively addresses each item of incomplete or unavailable information.

Background

Chukchi Sea Lease Sale 193 was held in February 2008, with BOEM accepting high bids of approximately \$2.7 billion and issuing 487 leases for approximately 2.8 million acres. As a result of a lawsuit challenging the sale, the U.S. District Court for the District of Alaska remanded Sale 193 for further NEPA analysis of three general concerns. Specifically, the Court found that the Agency failed to:

- (1) analyze the environmental impact of natural gas development, despite industry interest and specific lease incentives for such development;
- (2) determine whether missing information identified by the agency was relevant or essential under 40 C.F.R. § 1502.22; and
- (3) determine whether the cost of obtaining the missing information was exorbitant, or the means of doing so unknown.

The first concern above is addressed within the body of the Draft SEIS where BOEM has provided additional analysis on natural gas development and production. This Appendix addresses the second and third concerns by cataloguing statements within the 193 FEIS that acknowledged incomplete or unavailable information, and by providing a structured analysis of those statements. The concerns articulated by the Court were evaluated sequentially in this analysis by both resource analysts and managers (see Methodology below). Briefly, information was considered *relevant* if it could be connected to reasonably foreseeable significant adverse impacts as stipulated by CEQ regulation and following the significance criteria described for each resource in the 193 FEIS. All statements indicating relevant incomplete or unavailable information that would be relevant were then evaluated to determine whether the information was *essential* to a reasoned choice among alternatives. To be essential, the information must provide a means for making a clear distinction between two or more alternatives. Lastly, if missing information was determined to be relevant and essential, managers evaluated the potential means of obtaining the information to determine whether cost would be *exorbitant*.

Methodology

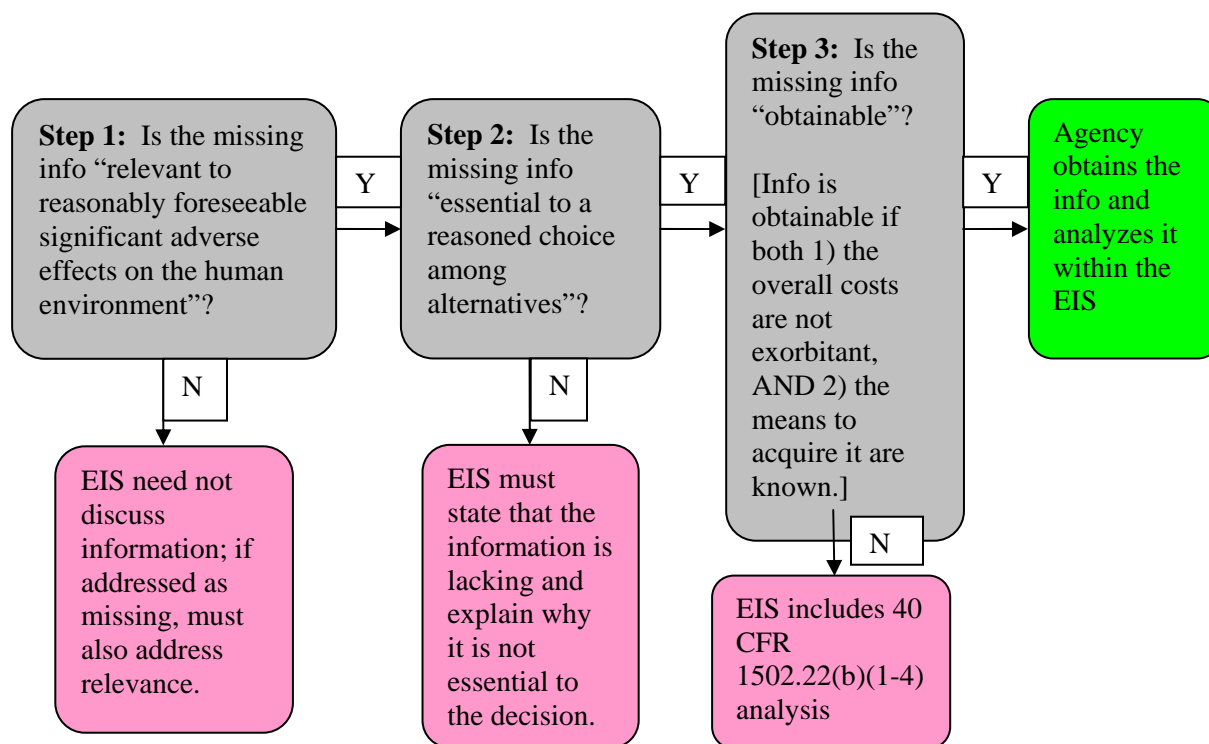
Appendix A catalogues all statements within the 193 FEIS that acknowledged incomplete or unavailable information. This list includes statements identified by the plaintiffs in litigation as well as additional statements independently identified by BOEM analysts for the purpose of this analysis. Each statement of incomplete or unavailable information then underwent a robust review process to ensure consistency with 40 CFR 1502.22, the relevant text of which reads:

1502.22 Incomplete or unavailable information.

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

- (a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.
- (b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:
1. A statement that such information is incomplete or unavailable;
 2. a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
 3. a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment, and
 4. the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

To promote thorough, consistent, and efficient review of the hundreds of catalogued statements, BOEM analysts used a structured review approach (illustrated by the figure below). This approach, taken directly from the language of 40 CFR 1502.22, consists of three steps. Each step asks a "Yes" or "No" question, the answer to which determines whether the analysis of the statement either progresses to the next step or the statement requires no further review. Where analysts answered "Yes," they simply moved on to the next question. Where analysts answered "No," they recorded the reasoning behind the answer in the spreadsheet that constitutes the body of Appendix A, thus concluding review of that statement. The completed analysis for all catalogued statements was then reviewed by supervisory and staff specialists, who confirmed the analysis and determined that it satisfied 40 CFR 1502.22.



Results

BOEM analysts determined that while many statements of incomplete or unavailable information were broadly relevant to the important issues at hand, none were essential for a reasoned choice among alternatives. As the statements were analyzed, some common themes became apparent with respect to the catalogued statements. These included the following:

- **The availability of sufficient information to support sound scientific judgments and reasoned managerial decisions, even without the identified incomplete or unavailable information.** This concept recognizes that while there will always be some level of incomplete information (especially regarding dynamic ecosystems), there is often enough information to formulate and support sound scientific judgments. Scientists frequently agree on larger issues and trends despite the lack of a particular item of information. For example, while scientists may not know each cause of natural mortality for bowheads, it is well known (and more important) that this population as a whole is growing. Also, some information is simply not of a type that would alter scientific judgments or affect decision-making. Some information simply is not significant or relevant enough to be considered essential to a reasoned decision among alternatives. For example, additional information about the winter food habits of a whale that is only present within the action area during summer months may not be significant or relevant enough to be considered essential to a reasoned decision among alternatives.
- **The presumption that adverse effects would certainly occur under the specific circumstance to which the incomplete information applies.** For instance, it is already presumed that a large oil spill could cause significant adverse impacts to wildlife and other resources, through myriad direct and indirect effects. Thus, it is not essential for the decision-maker, who is already made aware of the probability and severity of these potential impacts, to understand every particular mechanism through which these adverse impacts could occur. Additional information specific to how spilled oil may affect the functioning of a whale's blowhole, for example, is not required for an understanding of the probability and severity of risks associated with each alternative.
- **The commonality of potential impacts amongst all action alternatives, which lessened the utility of incomplete information to the decision-maker.** For example, in the unlikely event of a large oil spill, it is well-understood that environmental impacts could be severe. The severity of potential impacts would be nearly identical under any action alternative; therefore, very specific types of information relevant to species, particular life history traits, or behavior do not help substantially in distinguishing among alternatives.
- **The existence of other environmental laws and regulations that would preclude significant adverse effects on particular resources.** For example, comprehensive regulatory standards under the Clean Air Act are sufficient to preclude air quality impacts from reaching a level of significance. Incomplete information regarding air quality issues is in this sense less useful to the decision maker, who is assured that no matter which alternative he or she selects, significant adverse effects to air quality will be avoided.
- **The understanding that certain items of presently missing or incomplete information will be known (and utilized to avoid or minimize adverse impacts) at a later stage of OCS Lands Act environmental review.** The OCS Lands Act creates a four-stage process for planning, leasing, exploration, and development and production of oil and gas resources in Federal waters. The first two stages (the 5-Year Program stage and the Lease Sale stage) are largely programmatic in nature—the pending decision pertains to Stage 2, the lease sale stage. It is inherent in the process that information such as the specific locations or times of development and production activities (proposals for which are examined in Step 4) are not known at lease sale stage (Step 2). Instead, BOEM would thoroughly review specific development & production plans at Step 4, if and when a project proponent actually submits a plan. Thus, while certain

information may, in fact, be essential at a later stage of OCS Lands Act, such information may not be essential to a reasoned choice among alternatives at this lease sale stage.

It should be noted that no statements written specifically for the DSEIS are included or analyzed within this Appendix. The BOEM analysts have identified all relevant incomplete or unavailable information pertaining to natural gas development and production within the text of the DSEIS, and no incomplete or unavailable information pertaining to natural gas development and production was considered essential for a reasoned choice among DSEIS alternatives.

1502.22 Analysis

Page Number: ES-5

Actual Statement:

There is uncertainty about effects on cetaceans in the event of a large spill.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to adverse effects that are already assumed to occur under certain circumstances. The analysis already assumes that if a large oil spill occurs, significant impacts to cetaceans could follow. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: II-33

Actual Statement:

A review of available science and management literature shows that at present, there are no empirical data to document potential impacts from seismic surveys reaching a local population-level effect. The experiments conducted to date have not contained adequate controls to allow us to predict the nature of a change or that any change would occur.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

This passage of the EIS explains that despite a diligent literature review, we were unable to identify any data that suggested seismic surveys could result in significant adverse effects to fish populations. This finding does not conclude that such studies exist. As explained in the FEIS, available scientific information is sufficient to conclude no significant adverse effects are reasonably foreseeable (FEIS page IV-74). The lack of empirical data documenting population-level effects does not qualify as missing information relevant to reasonably foreseeable significant environmental effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: II-34

Actual Statement:

Given a lack of contemporary abundance and distribution information, large oil spill effects on rare or unique species (including potential extirpation) could occur, but would likely go unnoticed or undetected.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

It is well understood that the environmental impacts associated with a large oil spill could be quite severe. Rare species could be affected by such an event wherever they may occur throughout the lease sale area. These impacts are explained in great detail throughout Chapter 4 of the FEIS. Overall, it is clear that: (1) no large oil spills or spill-related impacts could result from a selection of the No Action Alternative; (2) potential spill impacts [including impacts to rare or unique species] are nearly identical under each action alternative (i.e. Alternatives 1, 3 and 4.); and (3) the probability of a large spill occurring is identical under each action alternative. In light of these considerations, the decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among lease sale alternatives. The identified "incomplete information" is therefore not essential to a reasoned choice among lease sale alternatives.

Page Number: II-35

Actual Statement:

Uncertainty exists about the potential effects of seismic surveys on bowhead whales (especially on calf survival and growth and female reproduction) in the Chukchi Sea due to a lack of current data about their use of the Proposed Action area during periods when seismic surveys could be occurring. What is known, however, is that the observed response of bowhead whales to seismic survey noise varies among studies. Some of the variability appears to be context specific (i.e. feeding versus migrating whales) and also may be related to the whales' reproductive status and/or sex or age.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from "industrial noises", BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that the bowhead whale is also protected against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: II-36

Actual Statement:

Bowheads respond to drilling noise at different distances depending on the types of platform from which the drilling is occurring. Data indicate that many whales can be expected to avoid an active drillship at 10-20 km or possibly more.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

This statement offers valuable, quantitative information on whale avoidance; however, it does not indicate missing information relevant to reasonably foreseeable adverse effects on the human environment.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: II-36

Actual Statement:

The long-term response of bowheads to production facilities located at the southern end of the migration corridor is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The southern end of the bowhead migration corridor is in the Bering Sea, outside of the proposed action area. This information is not related to any reasonably foreseeable significant adverse effect on the human environment associated with this Proposed Action.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: II-36

Actual Statement:

There is uncertainty about the effects on bowheads (or any large cetacean) from the event of a large oil spill.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

These effects, as well as the probability of these effects occurring, would be the same under each action alternative. The decision-maker already has sufficient information regarding the relative probability (as between the No Action Alternative and each action alternative) and various impacts of a large oil spill to allow a reasoned choice among each alternatives. Additional information regarding the effects on bowheads (or any large cetacean) from the event of a large oil spill is not essential to a reasoned choice among alternatives at this stage.

Page Number: II-37

Actual Statement:

Several areas historically documented to be important to marine and coastal birds in Sale 193 area, as well as the entire proposed lease sale area, lack site-specific data on habitat-use patterns, routes, and timing to assess impacts. For many species, the most recent data is between 15 and 30 years old, making accurate analysis difficult. Overall, several species or species-groups have a high probability of experiencing substantial negative impacts. The risk that several regional bird populations could experience significant adverse impacts is high.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the distribution of marine and coastal birds in the action area. However, sufficient information (population ranges, preferred habitat types, etc.) is available to support sound scientific judgments and informed decision-making at this lease sale stage, which is somewhat programmatic in nature. Detailed and current information regarding specific populations at specific location at specific times of year will be further evaluated during subsequent stages of the OCSLA process that focus on specific proposal in specific locations. In sum, this "incomplete information" is not essential to a reasoned choice among alternatives at this stage.

Page Number: II-37

Actual Statement:

Based on the paucity of information available on marine mammal ecology in the Chukchi Sea and on specific locations of future developments, we are unable to determine at this time if significant impacts will or will not occur.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

As this general statement indicates, there will be some level of incomplete information on marine mammal ecology in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. Activities with the potential to affect marine mammals will be subject to additional BOEM as well as NMFS and/or FWS review processes. Appropriate mitigation measures can and will be applied as proposals for specific activities are submitted. This multi-stage process permits more detailed review of each proposal and development of more tailored mitigation measures. Substantive and procedural requirements of the MMPA (and as applicable, ESA) requirements will serve to prevent significant adverse impacts. These requirements are common to all alternatives. In light of the above, any "incomplete information" regarding marine mammal ecology and specific locations of future developments is not essential to a reasoned choice between alternatives at this current stage.

Page Number: II-37

Actual Statement:

Because of the lack of data it is unknown if noise introduced into the environment from industrial activities, including drilling and seismic operations, will have an adverse impact on nonendangered and nonthreatened marine mammals in the Proposed Action area.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorizations generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from "industrial noises", BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: II-42

Actual Statement:

Because of the lack of data on marine mammal distributions and habitat use in offshore areas of the Chukchi Sea, it is uncertain what the level of effects would be in offshore areas.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the distribution of marine mammals in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. Significant impacts will be avoided under all alternatives via further NEPA review at later OCSLA stages, as well as ESA Section 7 consultation and substantive ESA and MMPA requirements. Overall, additional information on this subject is not essential for a reasoned choice among alternatives.

Page Number: II-45

Actual Statement:

However, because of the lack of data on marine mammal distributions and habitat use in offshore areas of the Chukchi Sea, it is uncertain what the level of effects would be in offshore areas.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the distribution and habitat use of marine mammals in the Chukchi Sea. However, as explained in Chapter 4 of the FEIS, much information is known. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. Additional information on these subjects is not essential to a reasoned choice among alternatives. Also, significant impacts will be avoided via further NEPA review at later OCSLA stages, as well as ESA Section 7 consultation and substantive ESA and MMPA requirements. This would occur under all alternatives -- a fact which further reduces the utility of any additional information at the current stage. In sum, additional information on this subject is not essential for a reasoned choice among alternatives.

Page Number: III-123

Actual Statement:

Due to a lack of specific data from the Chukchi Sea which would indicate where relative sea level stood at 13,000 years B.P., MMS is using the -60 m isobath as a conservative estimate of where the shoreline would have been in the Chukchi Sea at 12,000 years B.P. ... Although no data are available for the time period of 13,000 B.P., we have adopted -60 m as the possible depth of the sea level still-stand, corresponding to approximately 13,000 years B.P.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

This missing information is taken to pertain to potential impacts to archeological resources. Detailed information on the location of archeological resources is not needed during the first two stages of OCSLA environmental review, which are more programmatic in nature. Site-specific surveys would be required at later stages for activities with potential to disturb these resources. This is equally true for all action alternatives. Thus, this information is not essential for a reasoned choice among alternatives at the lease sale stage.

Page Number: III-123

Actual Statement:

No surveys of these shipwrecks have been made; therefore, no exact locations are known.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

Detailed information on the location of archeological resources is not needed during the first two stages of OCSLA environmental review, which are more programmatic in nature. Site-specific surveys would be required at later stages for activities with potential to disturb these resources. This is equally true for all action alternatives. Thus, this information is not essential for a reasoned choice among alternatives at the lease sale stage.

Page Number: III-15

Actual Statement:

The recurrence interval of ice gouging on the seafloor of the Chukchi Sea is unknown at this time. Quantitative information on ice gouges is sparse to nonexistent in the Chukchi Sea, except for localized surveys. Ice-gouge data were last collected on a regional basis more than 20 years ago, when instrument and navigation quality was less accurate than current technology. The MMS has collated all of the available ice-gouge and strudel-scour data for site-specific surveys and development surveys in the Beaufort Sea and is just beginning this effort in the Chukchi. At this time, there are insufficient interpreted data to predict the occurrence, extent, and magnitude of these features in a quantitative fashion for the region as a whole

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Additional quantitative information on historical ice gouging is not relevant to any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-22

Actual Statement:

Data are limited, but at least in one instance it has been shown that ice-deformation noise produced frequencies of 4-200 Hz (Greene, 1981).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Additional information on the frequency of noise produced by ice-deformation is not relevant to any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Surveys of coastal and marine fish resources in the Chukchi and Beaufort seas are typically conducted during periods that ice cover is greatly reduced (late July, August, or September) and information concerning the distribution, abundance, habitat use, etc., of marine fishes outside this period is limited. Due to the lack of specific information for many species, it is necessary to discuss the biology and ecology at the family level.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the distribution, abundance, habitat use, etc. outside of the open-water period in the Chukchi Sea. While certainly relevant in a general sense, this information is not essential to a reasoned choice among alternatives at the lease sale stage. Sufficient information on these issues is already available to support sound scientific judgments and reasoned managerial decisions regarding fish populations (see Chapters 3 and 4 of the FEIS). It is anticipated that given the nature of the proposed action, as well additional, site-specific review requirements (specifically NEPA and EFH consultation) that would apply at later stages of the OCS process, no significant impacts would occur to these resources under any alternative. Moreover, the missing information pertains to impacts that would be common to all action alternatives, and would be of limited utility in deciding between these options. Additional information is therefore not essential for a reasoned choice among alternatives.

Actual Statement:

Despite these previous works, several data deficiencies remain. Information of current distribution and abundance (e.g., fish per square kilometer) estimates, age structure, population trends, or habitat use areas are not available for fish populations in the northeastern Chukchi Sea. Many fish studies reporting distribution and/or abundance are 20-30 years old. Other studies are still older. For example, the only survey of demersal fishes in the region is more than 20 years old. Fish assemblages and populations in other marine ecosystems of Alaska (e.g., Gulf of Alaska, Bering Sea) have undergone observable shifts in diversity, distribution, and abundance during the last 20-30 years; it is not known if the findings of Frost and Lowry (1983) still accurately portray the diversity and abundance of demersal fishes in the Alaskan Beaufort Sea. The same is true for other dated studies. It is possible that they no longer accurately and precisely reflect the current distribution, abundance, and habitat use patterns of fish resources in the northeastern Chukchi and western Beaufort seas. Such information could be stale, or in some cases, stagnant. If so, accurate information concerning the distribution, abundance, and habitat use patterns of fish resources is incomplete and/or unavailable from which to accurately and/or precisely assess environmental impacts from the Proposed Action.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the distribution, abundance, habitat use, etc. in certain areas of the Chukchi Sea. While important overall, this information is not essential to a reasoned choice among alternatives at the lease sale stage. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions regarding fish populations. It is anticipated that given the nature of the proposed action, as well additional, site-specific review requirements (specifically NEPA and EFH consultation) that would apply at later stages of the OCS process, no significant impacts would occur to these resources under any alternative. Moreover, the missing information pertains to impacts that would be common to all action alternatives, and would not aid the decision between those alternatives. More information of this type is not essential for a reasoned choice among alternatives.

Actual Statement:

Another important data gap is the lack of information concerning discrete populations for arctic fishes. The literature abounds with casual references made of various fish populations without having delimited the population other than by perhaps using arbitrary boundaries of a study area, or presenting data without discriminating one discrete population unit from another. Additionally, a few marine species are regarded as widespread and/or abundant, yet distribution and density statistics for discrete populations are scarce, unknown, and therefore, incomplete. Several species are known only from a single specimen of each species; others are known from perhaps a handful of specimens collected years to decades ago. Population information is entirely lacking for such species.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information concerning discrete populations of arctic fish in the action area. While important overall, this information is not essential to a reasoned choice among alternatives at the lease sale stage. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions regarding fish populations. It is anticipated that given the nature of the proposed action, as well additional, site-specific review requirements (specifically NEPA and EFH consultation) that would apply at later stages of the OCS process, no significant impacts would occur to these resources under any alternative. Moreover, the missing information pertains to impacts that would be common to all action alternatives, and would not aid the decision between those alternatives. More information of this type is not essential for a reasoned choice among alternatives.

Actual Statement:

Marine waters support the most diverse, although least well known, fishes of the Alaskan Beaufort Sea region. Studies of marine fishes in the region are very limited; most of the surveys/studies have been performed in coastal waters landward of the landward of 200-m isobath, with scant surveys having sampled deeper waters. . . . [R]obust population estimates or trends for marine fishes of the region are unavailable. Distribution or abundance data for marine fish species are known only generally at the coarsest grain of resolution (for example, common, uncommon, rare).... Detailed information generally is lacking concerning the spread, density, or patchiness of their distribution in the overall Chukchi Sea region. Data concerning habitat-related densities; growth, reproduction, or survival rates within regional or local habitats; or productivity rates by habitat, essentially are unknown for fishes inhabiting waters seaward of the nearshore, brackish-water ecotone.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information concerning habitat-related densities, productivity rates, etc in the action area. While important overall, this information is not essential to a reasoned choice among alternatives at the lease sale stage. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions regarding fish populations. It is anticipated that given the nature of the proposed action, as well additional, site-specific review requirements (specifically NEPA and EFH consultation) that would apply at later stages of the OCS process, no significant impacts would occur to these resources under any alternative. Moreover, the missing information pertains to impacts that would be common to all action alternatives, and would not aid the decision between those alternatives. This information is not essential to a reasoned choice among alternatives.

Page Number: III-35

Actual Statement:

Life-history data for many of the demersal species using neritic substrates is lacking (e.g., whitespotted greenling, twohorn sculpin, spinyhook sculpin, veteran poacher); consequently, assessing the species resilience to perturbations is not feasible until additional information becomes available.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete life history information for demersal species using neritic substrates. This information is not essential to a reasoned choice among alternatives at the lease sale stage. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions regarding fish populations. It is anticipated that given the nature of the proposed action, as well as additional, site-specific review requirements applicable at later stages of the OCS process, no significant impacts would occur to these resources under any alternative. Moreover, the missing information pertains to impacts that would be common to all action alternatives, and would not aid the decision between those alternatives. This information is not essential to a reasoned choice among alternatives.

Page Number: III-35

Actual Statement:

No species of this assemblage are assessed as being of low resilience, because life-history data are lacking.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The absence of any indication that certain species may be less resilient does not represent missing information essential to a reasoned choice among alternatives.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-35

Actual Statement:

Surveys and studies of pelagic fishes inhabiting “offshore waters” (as defined by Jarvela and Thorsteinson [1999] as marine waters deeper than 2 m), especially those more than 30 m in depth, are scant.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population abundance, distribution, or vulnerability for pelagic fish in the Arctic. Such baseline information is important; however, sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. More detailed, site-specific information would be collected at later OSCLA review stages, when project proposals and locations would be available. Furthermore, the missing information pertains to impacts that are common to all alternatives, which tends to reduce the utility of such information to the decision-maker. Overall this information is not essential to a reasoned choice among alternatives at the lease sale stage.

Page Number: III-35

Actual Statement:

The more intimate aspects of their behavior are, however, still little known....

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Information on the intimate aspects of behaviors of cryopelagic fish is not relevant to any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-36

Actual Statement:

Arctic cod and Pacific sand lance are assumed to be of medium resilience to exploitation; polar cod and toothed cod are data deficient such that an assessment of resilience is not feasible with available information.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The proposed action would not entail any commercial fishing, and no commercial fishing occurs within the action area. The resiliency of these species to exploitation is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-36

Actual Statement:

Life-history statistics for most species covered in this assemblage are data deficient, chiefly for lack of fish surveys and studies in oceanic waters of the Alaskan arctic.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the oceanic-demersal assemblage of marine fish in the Chukchi Sea. Such background information is generally relevant to impacts assessment. However, sufficient information is already available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage, which is somewhat general and programmatic in nature. Subsequent NEPA and EFH reviews would capture and take into account more specific information, and significant impacts would be avoided. Also, the missing information pertains to impacts that are common to all action alternatives, which further limits the utility of this information. More information of this type is not essential for a reasoned choice among alternatives.

Page Number: III-39

Actual Statement:

Little is known of the movements undertaken during the 18 months the salmon spend at sea.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

As this general statement points out, there some level of uncertainty regarding movement patterns of juvenile pink salmon spend while at sea. However, sufficient information regarding the life cycle and movements of pink salmon is available to support sound scientific judgments and reasoned managerial decisions. Furthermore, the missing information pertains to potential impacts that could occur to the same degree under all action alternatives. Additional information on this issue would be of marginal utility and is not essential to a reasoned choice among alternatives.

Page Number: III-40

Actual Statement:

Chum salmon fry, like pink salmon, do not overwinter in streams but migrate (mostly at night) out of streams directly to sea shortly after emergence. The timing of outmigration in the arctic is unknown, but occurs between February and June (chiefly during April and May) in more southern waters.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of uncertainty as to the exact time period that certain salmon fry may emerge from Arctic streams along the Chukchi Sea coast. While relevant to potential impacts, this information is not essential to a reasoned choice among alternatives at the lease sale stage. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Furthermore, the missing information pertains to impacts that are common to all alternatives. Subsequent NEPA and EFH analyses will examine these issues as necessary at a later stage of the OCS process, when more information regarding specific sites and activities is known. This information is not essential to a reasoned choice among alternatives at this stage.

Page Number: III-40

Actual Statement:

Fish resources of the northeastern Chukchi Sea were last surveyed 15-17 years ago. Additionally, other surveys over the years and area reflect a pattern of temporally and spatially irregular and disjunct sampling. Such disorganized sampling and data reporting greatly influences the information quality necessary to determine population trends and adjustments to environmental perturbations. Establishing a current, accurate, and precise baseline is critical to assessing potential changes to biotic resources. It is unknown if the distribution and abundance information gathered by the last surveys remains an accurate and precise description of arctic fish populations today. This is an important because the Chukchi and Bering seas are considered to be large marine ecosystems serving as principle bellwethers to climate change in North America and the Arctic Ocean.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the Arctic fish population trends, population adjustments to environmental perturbations, and the relationship of the Chukchi Sea to climate change effects in North America. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions on these issues and general trends. Furthermore, the missing information pertains to impacts that are common to all alternatives, which reduces the ability of this information to help distinguish between alternatives. Overall, additional information on these subjects is not essential to a reasoned choice among alternatives.

Page Number: III-41

Actual Statement:

Adjustments by one or more fish populations often require adjustments within or among large marine ecosystems, influencing the distribution and/or abundance of competitors, prey, and predators. Consequently, it appears reasonable to believe that the composition, distribution, and abundance of fish resources in the northwestern Chukchi Sea is changing and is now different from that measured in the surveys conducted 15-17 years ago or earlier. The magnitude of these differences is unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the adjustments of Arctic fish populations to changes in the distribution of their predators, prey, and competitors in the Chukchi Sea in recent years. While potentially relevant, this information is not essential for a reasoned choice among alternatives. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Furthermore, the missing information pertains to impacts that are common to all alternatives, which reduces the value of the information in distinguishing between alternatives.

Page Number: III-42

Actual Statement:

No information was found as to the species inhabiting the areas; hence, we cannot describe their biology and ecology as relating to a baseline description.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population abundance, distribution, or vulnerability of marine invertebrate fisheries in specific areas within the Arctic. Such baseline information is important; however, sufficient information about these general topics is available to support sound scientific judgments and reasoned managerial decisions. Furthermore, the missing information pertains to impacts that are common to all alternatives, which tends to reduce the utility of the information to the decision-maker. Overall this information is not essential to a reasoned choice among alternatives at the lease sale stage.

Page Number: III-45

Actual Statement:

There is scientific uncertainty about the population structure of bowheads that use the Arctic Ocean.”

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

This statement highlights the nearly axiomatic truth that there will always be some level of scientific uncertainty regarding any dynamic population of animals. Fortunately, sufficient information regarding bowhead whales is available (and analyzed in the FEIS) to support sound scientific judgments and reasoned managerial decisions, and additional information is not essential for reasoned decisions among alternatives.

Page Number: III-45

Actual Statement:

Conservation concerns include: . . . uncertain potential impacts of climate warming. . .

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While there is some degree of unavoidable uncertainty as to the potential impacts of climate warming, much information regarding its basic mechanisms and general effects does exist and is analyzed in the FEIS. The amount and value of the information available is sufficient to support sound scientific judgments and reasoned managerial decisions. Further, the missing information applies equally to all alternatives, and would be of limited utility in distinguishing between respective levels of potential impact. For these reasons, additional information on this topic is not essential to a reasoned choice amongst alternatives.

Page Number: III-45

Actual Statement:

No data are available indicating that, other than historic commercial whaling, any previous human activity has had a significant adverse impact on the current status of BCB Seas bowheads or their recovery.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of an indication that any human activity has had a significant adverse impact on the current status of the BCB Seas bowhead or their recovery does not qualify as missing information relevant to reasonably foreseeable adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-45

Actual Statement:

The uncertainty of the stock structure adds some uncertainty to summaries of the status of bowheads that may be impacted by the Proposed Action.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

Scientists may not be 100% certain about the best way to organize their conceptual stock structures for bowheads in the larger region. However, sufficient information exists to support sound scientific judgments and reasoned managerial decision makers regarding potential impacts to Chukchi Sea bowheads from the Proposed Action and alternatives. Additional certainty on the structure of bowhead stocks is not essential to a reasoned choice among alternatives.

Page Number: III-45

Actual Statement:

Recent data to evaluate bowhead use of the Chukchi Sea Planning Area, or adjacent areas to the south, are lacking.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

As this general statement indicates, there will be some level of incomplete information on bowhead use of the Chukchi Sea and nearby areas. It is believed, however, that sufficient information on these topics is available and has been analyzed. Also, activities with the potential to affect marine mammals are subject to additional BOEM as well as NMFS and/or FWS review processes. Appropriate mitigation measures can and will be applied as proposals for specific activities are submitted. This multi-stage process permit more detailed review of each proposal, and development of more tailored mitigation measures. As per the MMPA and ESA, significant impacts must be avoided. These procedural and substantive requirements, which would ensure that site-specific info is analyzed and that potential impacts to marine mammals do not rise to significance, would apply equally under each alternative. Thus, additional bowhead use of these areas is not essential to a reasoned choice among alternatives at this stage of the review process.

Page Number: III-46

Actual Statement:

[I]f whales become more 'skittish' and more highly sensitized following a hunt, it may be that their subsequent reactions, over the short-term, to other forms of noise and disturbance are heightened by such activity. Data are not available that permit evaluation of this possible, speculative interaction.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There is some level of uncertainty regarding the speculative potential for short-term impacts to whales following hunts. However, sufficient information regarding whales behavior, avoidance patterns, etc are available to support sound scientific judgments and reasoned managerial decisions. It should also be noted that these possibilities have already been taken into account in the development of various alternatives and deferral areas. Enough is already known about this potential for impacts such that reasoned choices among alternatives can be made. Additional information on these issues is not essential.

Page Number: III-46

Actual Statement:

The NMFS has concluded that there is no reliable information about population-abundance trends, and that reliable estimates of current or historical abundance are not available, for the entire Northeast Pacific fin whale stock.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The fin whales is known to be a rare, though occasional visitor to the action area. Sufficient information on their (limited) use of the Chukchi exists to support sound scientific judgments and reasoned managerial decisions. Additional information regarding current or historical abundance of the Northeast Pacific fin whale stock is not essential to a reasoned choice among alternatives. Moreover, the substantive and procedural requirements of the MMPA and ESA would serve to preclude significant impacts to the fin whale under each alternative.

Page Number: III-46

Actual Statement:

We are not aware of data indicating how far hunting-related sounds (for example, the sounds of vessels and/or bombs) can propagate in areas where hunting typically occurs, but this is likely to vary with environmental conditions.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no connection between the missing information and any reasonably foreseeable significant adverse effects associated with the Proposed Action or alternatives. The FEIS does not anticipate any significant adverse effects to marine mammals outside the unlikely event of a large oil spill. Additionally, subsistence hunting would occur to the same extent under all alternatives, a fact which tends to further reduce the utility of such information to the decision-maker here.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-47

Actual Statement:

There are no recent data to confirm their use or lack of use of the Chukchi Sea Planning Area, or adjacent areas to the south.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of data confirming presence within the action area does not constitute missing information relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-48

Actual Statement:

Available information does not indicate humpback whales inhabit the Chukchi Sea OCS project area. There are no recent data to confirm their lack of use of the Chukchi Sea OCS Planning Area, or adjacent areas to the south.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of data confirming presence within the action area does not constitute missing information relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-48

Actual Statement:

Additional data are needed to determine if these data actually typify the bowhead population, and there is no single hypothesis adequate to explain the pattern.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The identified population (stock) is clearly identified in the EIS (page III-45) and any scientific uncertainty regarding genetic information is not relevant to any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-49

Actual Statement:

There is little information regarding causes of natural mortality for BCB Seas bowhead whales.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on bowhead whale mortality; however, knowing the different ways that bowhead whales die is not as important as understanding general population trends. For bowheads, the population trend is significantly positive. Overall, sufficient information exists to support sound scientific judgments and reasoned managerial decisions. Any incomplete information on this point is not essential to a reasoned choice among alternatives. Furthermore, the missing information pertains to impacts that are common to all alternatives, and would not be very useful in distinguishing between the respective impacts of various alternatives. □

Page Number: III-49

Actual Statement:

Little is known about the effects of microbial or viral agents on natural mortality.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the effects of microbial or viral agents on natural mortality of bowheads; however, knowing the different ways that bowhead whales die is not as important as understanding general population trends. For bowheads, the population trend is significantly positive. Overall, sufficient information exists to support sound scientific judgments and reasoned managerial decisions. Any incomplete information is not essential to a reasoned choice among alternatives. Furthermore, the missing information pertains to impacts that are common to all alternatives, and would of limited utility in distinguishing between the respective impacts of various alternatives.

Page Number: III-49

Actual Statement:

The amount of feeding in the Bering Sea in the winter is unknown as is the amount of feeding in the Bering Strait in the fall (Richardson and Thomson, 2002).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

This data gap pertains to areas not affected by the proposed action, and is not related to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-50

Actual Statement:

The MMS funded large-scale surveys in this area when there was oil and gas leasing and exploration, but while surveys in the Beaufort Sea have continued, the last surveys in the Chukchi Sea were about 15 years ago. These data were summarized by Mel'nikov, Zelensky, and Ainana (1997), Moore (1992), Moore and Clarke (1990), and Moore, DeMaster, and Dayton (2000). We have plotted counts of bowheads in the Chukchi Sea during those surveys (Fig. III.B-4), because they visually provide limited insight into areas where bowheads may be exposed to oil and gas activities should they occur in the Chukchi Sea Planning Area. However, we caution against over-interpretation of these data out of context of survey effort and, because these data were collected between 1979 and 1991, they should not be interpreted as indicating current use of the Chukchi Sea by bowhead whales; they are the best data available.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While there will be some level of incomplete information on the bowhead whale use of the Chukchi Sea, BOEM (formerly MMS) has conducted or commissioned extensive study bowhead use of the Chukchi Sea, and a general understanding of the bowhead migration has been accumulated. Existing information on general use and migration patterns is sufficient to support sound scientific judgments and reasoned managerial decisions, especially during the earlier stages of OCSLA review, which are necessarily more programmatic in nature. Furthermore, the missing information pertains to potential impacts equally applicable to each action alternatives, meaning that additional information on this subject is not likely to be useful to decision making at this stage. Overall, this incomplete information is not essential to a reasoned choice among alternatives. □

Page Number: III-51

Actual Statement:

Data are limited on the bowhead fall migration through the Chukchi Sea before the whales move south into the Bering Sea.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While there will be some level of incomplete information on the bowhead whale use particular portions of the Chukchi Sea, BOEM (formerly MMS) has conducted or commissioned extensive study bowhead use of the Chukchi Sea, and a general understanding of the bowhead migration (including fall migration) has been accumulated. Existing information on general use and migration patterns is sufficient to support sound scientific judgments and reasoned managerial decisions, especially during the earlier stages of OCSLA review, which are necessarily more programmatic in nature. Furthermore, the missing information pertains to potential impacts equally applicable to each action alternatives, meaning that additional information on this subject is not likely to be useful to decision making at this stage. Overall, this incomplete information is not essential to a reasoned choice among alternatives.

Page Number: III-52

Actual Statement:

Both MMS and the NSB believe that there are major questions about bowhead whale feeding that remain to be answered (Stang and George, 2003). Most of the available information about this topic (and presented in this EIS) is based on studies and observations conducted in the Alaska Beaufort Sea.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

As this general statement indicates, there will be some level of incomplete information on bowhead feeding in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. Activities with the potential to affect marine mammals will be subject to additional BOEM as well as NMFS and/or FWS review processes. Appropriate mitigation measures can and will be applied as proposals for specific activities are submitted. This multi-stage process permit more detailed review of each proposal, and development of more tailored mitigation measures. As per the MMPA and ESA, significant impacts must be avoided. This separate, thorough review and minimized potential for significant impacts is common to all alternatives. In light of the above, any "incomplete information" regarding bowhead feeding is not essential to a reasoned choice between alternatives at the lease sale stage.

Actual Statement:

It is unclear how important this feeding is in terms of meeting the annual food needs of the population or to meeting the food needs of particular segments of the population (e.g., see discussion in Richardson and Thomson, 2002). Many assumptions, such as those about residence time, an approximations influence current conclusions. Because marked individuals have not been studied, it is unclear how much variability also exists among classes of individuals or individuals within a class in habitat residency times, or what factors influence residency times.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

As this general statement indicates, there will be some level of incomplete information on bowhead feeding needs, residency times, etc in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. Activities with the potential to affect marine mammals will be subject to additional BOEM as well as NMFS and/or FWS review processes. Appropriate mitigation measures can and will be applied as proposals for specific activities are submitted. This multi-stage process permit more detailed review of each proposal, and development of more tailored mitigation measures. As per the MMPA and ESA, significant impacts must be avoided. This separate, thorough review and minimized potential for significant impacts is common to all alternatives. In light of the above, any "incomplete information" regarding marine mammal ecology and specific locations of future developments is not essential to a reasoned choice between alternatives at the lease sale stage.

Actual Statement:

The amount of feeding in the Chukchi Sea and Bering Strait in the fall is unknown as is the amount of feeding in the Bering Sea in the winter (Richardson and Thomson, 2002). Richardson and Thomson (2002:xxxviii) concluded that: "...behavioral, aerial-survey, and stomach-content data, as well as certain energetics data...show that bowheads also feed widely across the eastern and central Beaufort Sea in summer and fall." In mid- to late fall, at least some bowheads feed in the southwest Chukchi. Detailed feeding studies have not been conducted in the Bering Sea in the winter.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While there will be some level of incomplete information on the bowhead whale use of particular portions of the Chukchi Sea, BOEM (formerly MMS) has conducted or commissioned extensive study bowhead use of the Chukchi Sea, and a general understanding of the bowhead migration and feeding has been accumulated. Existing information on general use and migration patterns is sufficient to support sound scientific judgments and reasoned managerial decisions, especially during the earlier stages of OCSLA review, which are necessarily more programmatic in nature. Furthermore, the missing information pertains to potential impacts equally applicable to each action alternatives, meaning that additional information on this subject is not likely to be useful to decision making at this stage. Overall, this incomplete information is not essential to a reasoned choice among alternatives

Actual Statement:

No comparable data on feeding, girth, or energy content have been obtained during and after the whales feed in the Chukchi sea in mid- to late fall. Assumptions about residence times influence these energetics-related estimates. As noted, available data indicate there is variability in habitat use among years. Because marked individuals have not been studied, it is unclear how much variability also exists among individuals in habitat residency times or what factors influence residency times.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

Again, there will be some level of incomplete information on bowhead feeding needs, residency times, etc in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. Activities with the potential to affect marine mammals will be subject to additional BOEM as well as NMFS and/or FWS review processes. Appropriate mitigation measures can and will be applied as proposals for specific activities are submitted. This multi-stage process permit more detailed review of each proposal, and development of more tailored mitigation measures. As per the MMPA and ESA, significant impacts must be avoided. This separate, thorough review and minimized potential for significant impacts is common to all alternatives. In light of the above, any "incomplete information" regarding marine mammal ecology and specific locations of future developments is not essential to a reasoned choice between alternatives at the lease sale stage.

Actual Statement:

There are locations in the Beaufort Sea and the western Chukchi Sea where large numbers of bowheads have been observed feeding in many years. However, the significance of feeding in particular areas to the overall food requirements of the population or segments of the population is not clear.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While there will be some level of incomplete information on the significance of particular bowhead whale feeding areas within and near the action, BOEM (formerly MMS) has conducted or commissioned extensive study bowhead use of the Chukchi Sea, and a general understanding of the bowhead migration and feeding has been accumulated. Existing information on general use and migration patterns is sufficient to support sound scientific judgments and reasoned managerial decisions, especially during the earlier stages of OCSLA review, which are necessarily more programmatic in nature. Furthermore, the missing information pertains to potential impacts equally applicable to each action alternatives, meaning that additional information on this subject is not likely to be useful to decision making at this stage. Overall, this incomplete information is not essential to a reasoned choice among alternatives.

Page Number: III-55

Actual Statement:

Recent data on distribution, abundance, or habitat use in the Chukchi Sea Planning Area are not available.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While there will always be some lag between environmental change and available data that reflects that change, BOEM (formerly MMS) has conducted or commissioned extensive study bowhead use of the Chukchi Sea, and a general understanding of the bowhead distribution, abundance, and habitat use is known. Existing information is sufficient to support sound scientific judgments and reasoned managerial decisions, especially during the earlier stages of OCSLA review, which are necessarily more programmatic in nature. Furthermore, the missing information pertains to potential impacts equally applicable to each action alternatives, meaning that additional information on this subject is not likely to be useful to decision making at this stage. Overall, this incomplete information is not essential to a reasoned choice among alternatives.

Page Number: III-56

Actual Statement:

The NMFS has concluded that there is no reliable information about population-abundance trends, and that reliable estimates of current or historical abundance are not available, for the entire Northeast Pacific fin whale stock (Angliss and Lodge, 2002; Angliss and Outlaw, 2005:rev. 10/24/04). They provided a Potential Biological Removal for the Northeast Pacific Stock of 11.4.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The fin whales is known to be a rare, though occasional visitory to the action area. Sufficient information on their (limited) use of the Chukchi exists to support sound scientific judgments and reasoned managerial decisions. Additional information regarding current or historical abundance of the Northeast Pacific fin whale stock is not essential to a reasoned choice among alternatives. Moreover, the substantive and procedural requirements of the MMPA and ESA would serve to preclude adverse impacts to the fin whale under each alternative.

Page Number: III-56

Actual Statement:

There is little information about natural causes of mortality (Perry, DeMaster, and Silber, 1999a). The NMFS summarized that 'There are no known habitat issues that are of particular concern for this stock' (Angliss and Lodge, 2002, 2005). Perry, DeMaster, and Silber (1999a:51) listed the possible influences of disease or predation as 'Unknown.'

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on whale mortality. However, knowing the different ways that whales die is not as important as understanding general population trends, which are understood for all whale species that use the action area. Overall, sufficient information exists to support sound scientific judgments and reasoned managerial decisions. Any incomplete information on these issues is not essential to a reasoned choice among alternatives. Furthermore, the missing information pertains to impacts that are common to all alternatives, and would not be very useful in distinguishing between the respective impacts of various alternatives.□

Page Number: III-57

Actual Statement:

The importance of specific feeding areas to populations or subpopulations of fin whales in the North Pacific is not understood.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The fin whale is known to be a rare, though occasional visitory to the action area. Sufficient information on their (limited) use of the Chukchi exists to support sound scientific judgments and reasoned managerial decisions. Additional information on specific feeding is not essential to a reasoned choice among alternatives at this point in the OCSLA process, which entails more site-specific analysis at later stages. Moreover, the substantive and procedural requirements of the MMPA and ESA would serve to preclude adverse impacts to the fin whale under each alternative.

Page Number: III-57

Actual Statement:

Information is not available to us that would permit evaluation of the current use of this area by fin whales.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

Although there will be some level of incomplete information on fin whale habitat use, sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. It is known, for instance, that the fin whale is an infrequent though occasional visitor to certain portions of the Chukchi Sale Area. Activities with the potential to affect marine mammals will be subject to additional BOEM as well as NMFS and/or FWS review processes. Appropriate mitigation measures can and will be applied as proposals for specific activities are submitted. This multi-stage process permit more detailed review of each proposal, and development of more tailored mitigation measures. As per the MMPA and ESA, significant impacts must be avoided. This separate, thorough review and minimized potential for significant impacts is common to all alternatives. In light of the above, additional information regarding fin whale presence/absence is not essential to a reasoned choice between alternatives at the lease sale stage.

Page Number: III-58

Actual Statement:

There is 'no clear consensus' (Calambokidis et al., 1997:6) about the population stock structure of humpback whales in the North Pacific due to insufficient information (Angliss and Lodge, 2002) (see further discussion in USDOI, MMS,2003a,b).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The humpback whale is known to be a rare, though occasional visitory to the action area. Sufficient information on their (limited) use of the Chukchi exists to support sound scientific judgments and reasoned managerial decisions. Additional clarity on the stock structure of the Northeast Pacific humpback whale is not essential to a reasoned choice among alternatives. Moreover, the substantive and procedural requirements of the MMPA and ESA would serve to preclude adverse impacts to humpback whales under each alternative.

Page Number: III-59

Actual Statement:

Angliss and Outlaw (2005) stated that: 'There are no reliable estimates for the abundance of humpback whales at feeding areas for this stock' (the Western North Pacific Stock) 'because surveys of the known feeding areas are incomplete, and because not all feeding areas are known.' There are not conclusive or reliable data on current population trends for the western North Pacific stock (Perry, DeMaster, and Silber, 1999b; Angliss and Outlaw, 2005).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The humpback whale is known to be a rare, though occasional visitor to the action area. Sufficient information on their (limited) use of the Chukchi exists to support sound scientific judgments and reasoned managerial decisions. Additional information regarding specific feeding areas and exact population counts of the Northeast Pacific humpback whale stock is not essential to a reasoned choice among alternatives. Moreover, the substantive and procedural requirements of the MMPA and ESA would serve to preclude adverse impacts to humpback whales under each alternative.

Page Number: III-59

Actual Statement:

There is no conclusive information on what population those humpbacks that enter the Chukchi Sea belong to. Based on the breakdown presented above, however, it is most likely that these whales would belong to the Western North Pacific stock.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Additional information on which population those humpbacks that enter the Chukchi Sea belong to is not relevant to any reasonably foreseeable significant adverse effects identified by the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-59

Actual Statement:

The reliability of pre- and postexploitation and of current abundance estimates is uncertain. ... Perry, DeMaster, and Silber (1999b) caution that it is unclear whether these estimates are for the entire North Pacific or only the eastern North Pacific. With respect to the estimate of Johnson and Wolman and another postexploitation estimate of 1,400 by Gambell (1976), Calambokidis et al. (1997) concluded that "...the methods used for these estimates are uncertain and their reliability questionable.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Additional information on pre- and post-exploitation and of current abundance estimates is not relevant to any reasonably foreseeable significant adverse effects identified by the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-60

Actual Statement:

Causes of natural mortality in humpbacks in the North Pacific are relatively unknown, and rates have not been estimated.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on humpback whale mortality. However, knowing the different ways that whales die is not as important as understanding general population trends, which are understood for all whale species that use the action area. Overall, sufficient information exists to support sound scientific judgments and reasoned managerial decisions. Any incomplete information is not essential to a reasoned choice among alternatives. Furthermore, the missing information pertains to impacts that are common to all alternatives, and would not be very useful in distinguishing between the respective impacts of various alternatives.□

Page Number: III-62

Actual Statement:

Noting "limited data."

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on murre foraging areas in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions regarding potential impacts. Current, site-specific analysis of murre distribution and foraging areas is more feasible during later stages of OCSLA, once specific project proposals are submitted. Furthermore, the missing information largely pertains to impacts that are common to all action alternatives, and would not contribute much to a decision between them. In light of the above, any incomplete information on this subject is not essential to a reasoned choice among lease sale alternatives.□

Page Number: III-62

Actual Statement:

The current status of horned puffins in the Chukchi Sea is unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

This general statement points to the fact that there will always be some level of incomplete information on the past and current distribution and abundance of horned puffins in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions regarding potential impacts to this species under each alternative. Any incomplete information on these issues is therefore not essential to a reasoned choice among alternatives. It should also be remembered that subsequent environmental reviews under later OCSLA review stages will be able to consider more current information regarding specific project locations, and thus provide a more robust review than is possible at the lease sale stage. □

Page Number: III-62

Actual Statement:

The current status of the tufted puffin in the Chukchi Sea is also unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

This general statement points to the fact that there will always be some level of incomplete information on the past and current distribution and abundance of tufted puffins in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions regarding potential impacts to this species under each alternative. Any incomplete information on these issues is therefore not essential to a reasoned choice among alternatives. It should also be remembered that subsequent environmental reviews under later OCSLA review stages will be able to consider more current information regarding specific project locations, and thus provide a more robust review than is possible at the lease sale stage.

Page Number: III-62

Actual Statement:

In this way, horned puffins could be similar to murres, although the degree to which prey species/foraging areas overlap is unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on seabird foraging areas and dietary overlap in the project area. However, sufficient information is available regarding both horned puffins and murres to support sound scientific judgments and reasoned managerial decisions for both types of birds. These species are both listed under the ESA, have been the subject of in-depth consultation with USFWS, and will be further analyzed should specific project proposals result from a lease sale. Additional information of the type referenced here is not essential to a reasoned choice among alternatives at this stage.

Page Number: III-63

Actual Statement:

The current status of the black-legged kittiwake (*Rissa tridactyla*) in the Chukchi Sea is unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

This general statement points to the fact that there will always be some level of incomplete information on the past and current distribution and abundance of black-legged kittiwake in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions regarding potential impacts to this species under each alternative. Any incomplete information on these issues is therefore not essential to a reasoned choice among alternatives. It should also be remembered that subsequent environmental reviews under later OCSLA review stages will be able to consider more current information regarding specific project locations, and thus provide a more robust review than is possible at the lease sale stage.

Page Number: III-63

Actual Statement:

The portion of this population in the proposed lease sale area is unknown, but could be substantial late in the open-water season. Seasonal areas of concentration, if any, are unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

This general statement points to the fact that there will always be some level of incomplete information on the past and current distribution and abundance of marine and coastal bird species in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions regarding potential impacts to this species under each alternative. Any incomplete information on these issues is therefore not essential to a reasoned choice among alternatives. It should also be remembered that subsequent environmental reviews under later OCSLA review stages will be able to consider more current information regarding specific project locations, and thus provide a more robust review than is possible at the lease sale stage.

Page Number: III-63

Actual Statement:

The current status of the northern fulmar (*Fulmarus glacialis*) is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on the northern fulmar. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of northern fulmars is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-63

Actual Statement:

The current status of the short-tailed shearwater (*Puffinus tenuirostris*) in the Chukchi Sea is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on the short-tailed shearwater. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of short-tailed shearwaters is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-63

Actual Statement:

The current status of parakeet (*Cyclorhynchus psittacula*), least (*Aethia pusilla*) and crested (*A. cristatella*) auklets in the Chukchi Sea is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on parakeet, least and crested auklets. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of these auklets is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-63

Actual Statement:

The current status of the black guillemot (*Cephus grylle*) in the Chukchi Sea is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on the black guillemot. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of black guillemots is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-64

Actual Statement:

The current status of the ivory gull (*Pagophila eburnea*) in the Chukchi Sea is unknown. Divoky (1987) reported that ivory gulls are closely associated with the ice edge throughout their lifecycle. Ivory gulls are considered uncommon to rare in pelagic waters of the Chukchi during summer, and small numbers migrate through in fall to wintering areas in the northern Bering Sea.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on the ivory gull. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of ivory gulls is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-64

Actual Statement:

The current status of the Arctic tern (*Sterna paradisaea*) in the Chukchi Sea is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on the Arctic tern. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of Arctic terns is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-64

Actual Statement:

The current status of the glaucous gull (*Larus hyperboreus*) in the Chukchi Sea is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on the glaucous gull. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of glaucous gulls is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-64

Actual Statement:

The current status of jaegers in the Chukchi Sea is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on any species of jaegers in the Chukchi Sea. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of Arctic these jaegers is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-65

Actual Statement:

Compared to what is known about yellow-billed loons near the Beaufort Sea coast, there is very little known about the coastal areas bordering the Chukchi Sea.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

This general statement points to the fact that there will always be some level of incomplete information on the distribution and abundance of yellow-billed loons. Although less information is known about the Chukchi coast as compared to the Beaufort coast, there still exists sufficient information overall to support sound scientific judgments and reasoned managerial decisions regarding potential impacts to yellow-billed loons under each Chukchi Sea lease sale alternative. Any incomplete information on these issues is therefore not essential to a reasoned choice among alternatives. It should also be remembered that subsequent environmental reviews under later OCSLA review stages will be able to consider more current information regarding specific project locations, and thus provide a more robust review than is possible at the lease sale stage.

Page Number: III-66

Actual Statement:

During spring migration, the common eider (*Somateria mollissima*) typically migrates along the Chukchi Sea coast, using offshore open-water leads. Offshore migration distances are poorly understood for the Chukchi Sea, but in the Beaufort Sea they are usually found within 48 km (29 mi) of shore.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on the common eider. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of common eiders is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-68

Actual Statement:

Pacific Brant "The current status of the Pacific brant along the Chukchi Sea is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on the Pacific brant. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of Pacific brants is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-68

Actual Statement:

The current status of greater white-fronted geese along the Chukchi Sea coast is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on greater white-fronted geese. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of greater white-fronted geese is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-68

Actual Statement:

Ritchie et al. (2006) reported that the number of snow geese nesting on the Ikpikpuk River delta continued to increase substantially from numbers recorded prior to 1999. There are no comparable data for the Kukpowruk River delta colony.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on snow geese. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of snow geese is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-69

Actual Statement:

The North American population of bar-tailed godwits (*Limosa lapponica baueri*) breeds in western and northern Alaska. Postbreeding bar-tailed godwits move to staging grounds along the Bering Sea Coast and then apparently fly nonstop 11,000 km to New Zealand. Recent counts conducted at both breeding and nonbreeding sites provide evidence of a serious and rapid population decline (McCaffrey et al., 2006), but the cause of the decline is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on bar-tailed godwits. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of bar-tailed godwits is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-69

Actual Statement:

The abundance and distribution of bar-tailed godwits in northern Alaska and coastal areas of the Chukchi Sea are not well understood.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on bar-tailed godwits. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of bar-tailed godwits is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-70

Actual Statement:

Buff-Breasted Sandpiper (species of concern) Noting "limited data."

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects on the Buff-Breasted Sandpiper. Such effects would not occur, even in the unlikely event of a large oil spill. Therefore, any "missing" information on the current status of Buff-Breasted Sandpipers is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-71

Actual Statement:

Little is known about the biology or population dynamics of ice seals, and they have received little attention compared with other Bering/Chukchi Sea species known to be in decline. Accurate population estimates for ice seals are not available and are not easily attainable due to their wide distribution and problems associated with research in remote, ice-covered waters (Quakenbush and Sheffield, 2006). Although little is known about the population status of ice seals, there is cause for concern. Sea ice is changing in thickness, persistence, and distribution (Sec. III.A.4, Sea Ice), and evidence indicates that oceanographic conditions have been changing in the Bering Sea (Sec. III.A.3, Oceanography), which suggests that changes in the ecosystem may be occurring as well (Quakenbush and Sheffield, 2006).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of ice-seals in the Chukchi Sea. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate population counts and distribution prediction are not essential for a reasoned choice among alternatives at this stage. Further, this information pertains to impacts that would be common under each action alternative, a fact which further reduces the utility of this information to the decision-maker. The MMPA and its implementing regulations would ensure that potential impacts remain negligible level under each alternative. The only risk for impacts above "negligible" pertains to a large oil spill, the probability of which does not differ between action alternatives.

Page Number: III-71

Actual Statement:

No reliable estimate for the size of the Alaska ringed seal stock is available (Angliss and Outlaw, 2005) . . .

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of ice-seals in the Chukchi Sea. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate population counts and distribution prediction are not essential for a reasoned choice among alternatives at this stage. Also, this information pertains to impacts that would be common under each action alternative, a fact which further reduces the utility of this information to the decision-maker. The MMPA and its implementing regulations would ensure that potential impacts remain negligible level under each alternative. The only risk for impacts above "negligible" pertains to a large oil spill, the probability of which does not differ between action alternatives.

Page Number: III-72

Actual Statement:

No reliable estimate for the size of the Alaska spotted seal stock is available (Angliss and Outlaw, 2005).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of ice-seals in the Chukchi Sea. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate population counts and distribution prediction are not essential for a reasoned choice among alternatives at this stage. Also, this information pertains to impacts that would be common under each action alternative, a fact which further reduces the utility of this information to the decision-maker. The MMPA and its implementing regulations would ensure that potential impacts remain negligible level under each alternative. The only risk for impacts above "negligible" pertains to a large oil spill, the probability of which does not differ between action alternatives.

Page Number: III-73

Actual Statement:

Ribbon seals inhabit the North Pacific Ocean and the adjacent fringes of the Arctic Ocean. In Alaska, they range northward from Bristol Bay in the Bering Sea and into the Chukchi and western Beaufort seas. They are found in the open sea, on pack ice, and rarely on shorefast ice (Kelly, 1988). As the ice recedes in May to mid-July, they move farther north in the Bering Sea, hauling out on the receding ice edge and remnant ice (Burns, Shapiro, and Fay, 1981). Seal distribution throughout the rest of the year is largely unknown; however, recent information suggests that many ribbon seals migrate into the Chukchi Sea for the summer months (Kelly, 1988).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the distribution and population status of ice-seals in the Chukchi Sea. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate population counts and distribution predictions are not essential for a reasoned choice among alternatives at this stage. This information pertains to impacts that would be common under each action alternative, a fact which further reduces the utility of this information to the decision-maker. The MMPA and its implementing regulations would ensure that potential impacts remain negligible level under each alternative. The only risk for impacts above "negligible" pertains to a large oil spill, the probability of which does not differ between action alternatives.

Page Number: III-73

Actual Statement:

No reliable estimate for the size of the Alaska ribbon seal stock is available (Angliss and Outlaw, 2005).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of ice-seals in the Chukchi Sea. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate population counts and distribution prediction are not essential for a reasoned choice among alternatives at this stage. This information pertains to impacts that would be common under each action alternative, a fact which further reduces the utility of this information to the decision-maker. The MMPA and its implementing regulations would ensure that potential impacts remain negligible level under each alternative. The only risk for impacts above "negligible" pertains to a large oil spill, the probability of which does not differ between action alternatives.

Page Number: III-74

Actual Statement:

No reliable estimate for the size of the Alaska bearded seal stock currently is available (Angliss and Outlaw, 2005). Bengtson et al. (2005) conducted surveys in the eastern Chukchi Sea but could not estimate abundance from their data.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of ice-seals in the Chukchi Sea. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate population counts and distribution prediction are not essential for a reasoned choice among alternatives at this stage. This information pertains to impacts that would be common under each action alternative, a fact which further reduces the utility of this information to the decision-maker. The MMPA and its implementing regulations would ensure that potential impacts remain negligible level under each alternative. The only risk for impacts above "negligible" pertains to a large oil spill, the probability of which does not differ between action alternatives.

Page Number: III-74

Actual Statement:

No reliable estimate is currently available for the size of the Alaskan stock of Pacific walrus (Angliss and Outlaw, 2005). However, available evidence indicates that the population is likely in decline (Kelly, Quakenbush, and Taras, 1999; Kochnev, 2004).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of ice-seals in the Chukchi Sea. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate population counts and distribution prediction are not essential for a reasoned choice among alternatives at this stage. This information pertains to impacts that would be common under each action alternative, a fact which further reduces the utility of this information to the decision-maker. The MMPA and its implementing regulations would ensure that potential impacts remain negligible level under each alternative. The only risk for impacts above "negligible" pertains to a large oil spill, the probability of which does not differ between action alternatives.

Page Number: III-76

Actual Statement:

No reliable estimate for the size of the Alaska Pacific walrus stock is available (Angliss and Outlaw, 2005).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of ice-seals in the Chukchi Sea. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate population counts and distribution prediction are not essential for a reasoned choice among alternatives at this stage. This information pertains to impacts that would be common under each action alternative, a fact which further reduces the utility of this information to the decision-maker. The MMPA and its implementing regulations would ensure that potential impacts remain negligible level under each alternative. The only risk for impacts above "negligible" pertains to a large oil spill, the probability of which does not differ between action alternatives.

Page Number: III-76

Actual Statement:

The population size has never been known with certainty; however, the most recent survey estimate was approximately 201,039 animals (Gilbert et al., 1992).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of ice-seals in the Chukchi Sea. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate population counts and distribution prediction are not essential for a reasoned choice among alternatives at this stage. This information pertains to impacts that would be common under each action alternative, a fact which further reduces the utility of this information to the decision-maker. The MMPA and its implementing regulations would ensure that potential impacts remain negligible level under each alternative. The only risk for impacts above "negligible" pertains to a large oil spill, the probability of which does not differ between action alternatives.

Page Number: III-76

Actual Statement:

Based on recent telemetry studies on eastern Chukchi belugas, it is likely that members from both stocks occur in similar places and at similar times during the fall migration although the significance of this is unknown (Suydam, Lowry, and Frost, 2005).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Lack of information specific to the potential "significance" of two beluga stocks occurring at the same place at similar times during the fall migration does not constitute missing information relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-77

Actual Statement:

Winter food habits of belugas are largely unknown;

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Belugas move out of the project area during the winter, into Russian waters and the Bering Sea. The feeding habits of beluga during these times is not related to any reasonably foreseeable adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-77

Actual Statement:

Belugas generally are associated with ice and relatively deep water throughout the summer and autumn, which may reflect their preference for feeding on ice-associated arctic cod (Moore et al., 2000). Late-summer distribution and fall-migration patterns are poorly known, wintering areas are effectively unknown, and areas that are particularly important for feeding have not been identified (Suydam, Lowry, and Frost, 2005).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the seasonal distributions, including feeding areas, of belugas in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Additional NEPA review processes will take into account project details and specific locations. Also, substantive provisions of the MMPA would protect the beluga under all alternatives. In light of these considerations, additional information on beluga migration patterns is not essential to a reasoned choice among alternatives at this time.

Page Number: III-78

Actual Statement:

There are no reliable estimates for the Alaska stock of minke whales. A provisional estimate was made for the Bering Sea of 810 individuals; however, this is not used for the Alaska stock because the entire stock's range was not surveyed.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of minke whales in Alaska waters. All estimates are exactly that - estimates - because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate counts are not essential for a reasoned choice among alternatives. Furthermore, the missing information pertains to impacts that are common to all alternatives, a fact which further reduces the utility of this information to the decision maker.

Page Number: III-78

Actual Statement:

The harbor porpoise inhabits shallow, coastal areas in temperate, subarctic, and arctic waters of the Northern Hemisphere (Read, 1999). In the North Pacific, harbor porpoises range from Point Barrow, Alaska to Point Conception, California (Gaskin, 1984). In Alaska, three separate stocks have been recommended, although there is insufficient biological data to support the designation at this time.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Lack of biological data to support subdividing the harbor porpoise population into separate stocks does not qualify as missing information relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-81

Actual Statement:

The maximum reproductive age for polar bears is unknown, but is likely well into their 20's (Amstrup, 2003).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

Sufficient information regarding the general reproductive capacity of polar bears is known to support sound scientific judgments and reasoned managerial decisions. Additional information on the maximum reproductive age for polar bears is not essential for a reasoned choice among alternatives.

Page Number: III-84

Actual Statement:

A reliable estimate for the CBS stock of polar bears, which ranges into the southern Beaufort Sea, does not exist, and its current status is in question. In 2002, the IUCN/SSG Polar Bear Specialist Group estimated the size of the CBS population at 2000+ bears, though the certainty of this estimate was considered poor (Lunn, Schliebe, and Born, 2002).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of polar bears in the Chukchi and Berin Seas. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. More accurate counts are not essential for a reasoned choice among alternatives. Furthermore, the missing information pertains to impacts that are common to all alternatives, a fact which further reduces the utility of this information to the decision maker.

Page Number: III-84

Actual Statement:

[W]ith the collapse of the Soviet empire in 1991, levels of illegal harvest dramatically increased in Chukotka in the Russian Far East (Amstrup, 2000; USDOJ, FWS, 2003). While the magnitude of the Russian harvest from the CBS is not precisely known, some estimates place it as high as 400 bears per year, although the figure is more likely between 100 and 250 bears per year.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The exact size of illegal harvest of polar bears in Russia is not related to any component of the proposed action or relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: III-84

Actual Statement:

[B]ecause of the unknown rate of illegal take currently taking place, in 2006 the IUCN/SSG Polar Bear Specialist Group designated the status of the CBS stock as “declining” from its previous estimate of 2000+ animals (IUCN/SSG Polar Bear Specialist Group, 2006).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the exact amount of illegal take of polar bear. However, specialists have agreed to a population size and trend for management purposes. Such information was used to support sound scientific judgments and reasoned managerial decisions. Additional data regarding illegal take is not essential for a reasoned choice among alternatives. Furthermore, missing information pertains to activities outside the scope of the Proposed Action, and potential impacts common to all alternatives, facts which further reduce the utility of this information to the decision maker.

Page Number: III-88

Actual Statement:

The number of muskoxen that occur within the Proposed Action is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no potential for significant adverse effects to muskoxen. More specific information on the number of muskoxen within the Proposed Action area is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-32

Actual Statement:

Direct estimates or measurements of total recoverable concentrations of metals in discharged drilling muds are not available.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

As explained in the FEIS, there is no potential for the discharge of drilling muds to cause significant adverse effects. Additional information on metal concentrations is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

Page Number: IV-51

Actual Statement:

Because of the paucity of studies in the Chukchi Sea, a review of the available science and management literature shows that at present, there are no empirical data to document potential impacts from seismic surveys reaching a local population-level effect; also, the experiments conducted to date have not contained adequate controls in place to allow us to predict the nature of a change or that any change would occur. (see #3 above)

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The absence of data demonstrating population-level impacts does not constitute missing information relevant to reasonably foreseeable significant adverse impacts.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-54

Actual Statement:

While we cannot say with certainty the impacts of seismic surveys on fish feeding behavior, there is no present evidence that the behavioral impact of seismic surveys has a major effect on fish feeding, except perhaps in the immediate vicinity of an active survey vessel.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of data demonstrating a major effect does not qualify as missing information relevant to reasonably foreseeable significant adverse effects. The FEIS did not identify a possibility of significant adverse effects from these identified activities.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-60

Actual Statement:

Eggs deposited in the proximity of the contaminated substrate over a series of years likely would be exposed to oil (PAH's) retained in the substrate, as PAH's in weathered oil can be biologically available for long periods and very toxic to sensitive lifestages, subsequently leading to lethal and sublethal effects to those offspring of successive generations. It is not known what such a behavioral response may have on the dynamics of the population; however, the spawning site likely would be unavailable for use for multiple generations, depending on the sensitivity of the capelin to detecting contaminated substrates and how long the oil persists in the localized habitat.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that if oil contacted spawning locations, significant impacts would occur. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. Additional information on the myriad potential mechanism of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-61

Actual Statement:

A number of diadromous species in the region have complicated life-history patterns that are not fully understood.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete understanding of the complicated life histories of diadromous fish species in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Additional information is not essential to a reasoned choice among alternatives.

Page Number: IV-61

Actual Statement:

Effects on recruitment would be particularly difficult to assess, because very few studies of offshore fishes have been made.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the recruitment patterns of all fishes of offshore areas of the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Moreover, additional processes (more NEPA during subsequent OCSLA stages, EFH consultation) will utilize site- and project-specific analysis to help ensure lack of significant impacts under each alternative. Thus additional information on recruitment patterns of offshore fish is not essential to a reasoned choice among alternatives at this stage of the process.

Page Number: IV-62

Actual Statement:

Although arctic cod can be extremely abundant in nearshore lagoonal areas, the importance of nearshore versus offshore environments to the lifecycle is not known (Craig et al., 1982). Although it is known that juvenile arctic cod associate with floating ice, it is unknown to what degree this association contributes to the development and survival of young fishes later recruiting to the breeding population. If early lifehistory stages of arctic cod were concentrated in nearshore environments, in patches in the open ocean, or under floating ice, they certainly would be more vulnerable to effects from an oil spill impacting such habitats.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the association of juvenile arctic cod and sea ice, especially as it pertains to survival and recruitment, in the Chukchi Sea. While potentially important, this information is not essential to a reasoned choice among alternatives at this time. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Additional review processes (NEPA, EFH) would take into account the more detailed site and project information which would be available at that time.

Page Number: IV-63

Actual Statement:

Also unknown are the distribution and abundance of spawning sites used by capelin in the Alaskan Arctic.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the distribution and abundance of capelin spawning sites in the Chukchi Sea. While potentially important, this information is not essential to a reasoned choice among alternatives at this time. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Additional review processes (NEPA, EFH) would take into account the more detailed site and project information which would be available at that time.

Page Number: IV-67

Actual Statement:

Although the mechanism for the apparent decline in smolt abundance is uncertain, the result of overescapement and too many salmon fry to be supported by the available prey may be the cause. The extent of the decline was speculative.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no connection between the uncertainty about the mechanism for the apparent decline in smolt abundance observed in a southern portion of Alaska and any reasonably foreseeable significant adverse effects here.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-72

Actual Statement:

While small-spills are required to be reported, the number of unreported spills is unknown. Not all spills would be expected to receive a spill-response. Overall, it is unclear whether, over the long-term and in the absence of a monitoring program to assess effects, any negative impacts to fish resources from chronic small spills would be detected.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of an indication that any small oil spills going unreported may or may not be causing impacts does not qualify as missing information relevant to reasonably foreseeable adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-74

Actual Statement:

A review of the available science and management literature shows that at present, there are no empirical data to document potential impacts from seismic surveys reaching a local population-level effect.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The absence of data demonstrating population-level impacts does not constitute missing information relevant to reasonably foreseeable significant adverse impacts.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-74

Actual Statement:

A review of the available science and management literature shows that at present, there are no empirical data to document potential impacts from seismic surveys reaching a local population-level effect. The experiments conducted to date have not contained adequate controls to allow us to predict the nature of a change or that any change would occur

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The absence of data demonstrating population-level impacts does not constitute missing information relevant to reasonably foreseeable significant adverse impacts.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-81

Actual Statement:

Absent direct information on potential effects on baleen calves, we draw on more general mammalian literature about potential effects on very young individuals.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the potential effects of oil on baleen whale calves in the project area. Such information is important; however, sufficient information (specifically the wealth of mammalian literature referenced for this analysis) is available to support sound scientific judgments and reasoned managerial decisions. Direct information on potential effects to baleen calves is not essential for a reasoned choice among alternatives at this stage. Further, impacts will be reduced and/or precluded through additional, site-specific review and ESA Section 7 consultation in the future.

Actual Statement:

There are multiple sources of uncertainty in our analyses. These include, but are not limited to uncertainty about the action: where seismic surveys will occur; how many surveys will occur; how much noise will be produced purposely by the firing of airguns; what the exact shape of related ancillary activities, such as support vessel type and activity will be; where exploration drilling could occur; where leases will be let; where a spill could occur; where production platforms and pipelines may be based; etc. More important, there is acknowledged (NRC, 2003, 2005; minutes from meetings of the Marine Mammal Commission Sound Advisory Panel, 2004, 2005 from their web site) scientific uncertainty about the potential effects of noise, especially repeated exposure to loud noise, on baleen whales. There is uncertainty and controversy regarding the potential effects of oil spills on large cetaceans. There are very few, if any, data available about potential effects of either noise or oil spills on cetacean calves. Lastly, and importantly, data are not available sufficient to characterize the current seasonal and temporal use of the Chukchi Sea Planning Area by bowheads and other whales, or to fully understand the importance of parts of the Beaufort Sea to bowhead whales. Thus, it is difficult to predict exposure in some parts of the area where the action could occur and to understand fully the potential effects of any exposure.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The first half of this statement contains general language which demonstrates some of the benefits of conducting multi-stage environmental review as per the four-stage OCSLA process. This information, while not essential at this stage, will be used at later stages to inform detailed environmental reviews and avoid impacts. The second half of this statement contains general language highlighting points of uncertainty within current science regarding whales and potential impacts to whales. There will be some level of incomplete information on the potential effects of oil exploration and development activities on baleen whales, including bowhead whale calves, in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Also, additional review processes (NEPA, ESA Section 7 consultation, etc.) will help ensure lack of significant impacts to these animals. Thus additional information is not essential to a reasoned choice among alternatives. Also, it should be noted that the only component of the Proposed Action that could significant effect whales is the small risk of a large oil spill. The probability of such an event, and the severity of its potential impacts, is constant between all action alternatives, which further reduces the utility of this information to the decision maker.

Actual Statement:

[T] here are few instances where data are sufficient to evaluate the total energy exposure of a marine mammal from a given source. At present, we do not have the data necessary to make such a determination or understand how it might change our analysis.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Despite the increasing concern and attention noted above, there still is uncertainty about the potential impacts of sound on marine mammals; on the factors that determine response and effects; and especially on the long-term, cumulative consequences of increasing noise in the world's oceans from multiple sources (NRC, 2003, 2005). The NRC (2005) concluded that it is unknown how or in what cases responses of marine mammals to anthropogenic sound rise to the levels of biologically significant effects. This group also developed an approach of injury and behavioral "take equivalents". These take equivalents use a severity index that estimates the fraction of a take experienced by an individual animal. This severity index is higher if the activity could be causing harassment at a critical location or during a critical time (e.g., calving habitat). Because we have uncertainty about exactly where and how much activity will occur, the recommendations from the NRC (2005) are qualitatively incorporated in MMSs analysis.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

While there is some general information available, evaluation of the impacts of noise on marine mammal species, particularly on cetaceans, is greatly hampered by a considerable uncertainty about their hearing capabilities and the range of sounds used by the whales for different functions (Richardson et al., 1995a; Gordon et al., 1998; NRC, 2003, 2005). This is particularly true for baleen whales. Very little is known about the actual hearing capabilities of the large whales or the impacts of sound on them, especially on them physically. While research in this area is increasing, it is likely that we will continue to have great uncertainty about physiological effects on baleen whales because of the difficulties in studying them. Baleen whale hearing has not been studied directly. There are no specific data on sensitivity, frequency or intensity discrimination, or localization (Richardson et al., 1995a). Thus, predictions about probable impacts on baleen whales generally are based on assumptions about their hearing rather than actual studies of their hearing (Richardson et al., 1995a; Gordon et al., 1998; Ketten, 1998).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Based on indirect evidence, at least some baleen whales are quite sensitive to frequencies below 1,000 Hz but can hear sounds up to a considerably higher but unknown frequency.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

even though there are no direct data from hearing tests on any baleen whale.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Little data are available about how, over the long term, most marine mammal species (especially large cetaceans) respond either behaviorally or physically to intense sound and to long-term increases in ambient noise levels. Large cetaceans cannot be easily examined after exposure to a particular sound source.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

There are no data on which to determine the kinds or intensities of sound that could cause a TTS in a baleen whale.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Repeated long exposures to intense sound or sudden onset of intense sounds generally characterize sounds that cause permanent threshold shift in humans. Ketten (1998) stated that age-related hearing loss in humans is related to the accumulation of permanent-threshold shift and TTS damage to the ear. Whether similar age-related damage occurs in cetaceans is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Most experiments have looked at the characteristics (e.g., intensity, frequency) of sounds at which TTS and permanent threshold shift occurred. However, while research on this issue is occurring, it is still uncertain what the impacts may be of repeated exposure to such sounds and whether the marine mammals would avoid such sounds after exposure, even if the exposure was causing temporary or permanent hearing damage, if they were sufficiently motivated to remain in the area (e.g., because of a concentrated food resource).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Long-term impacts of OCS seismic-survey noise on the hearing abilities of individual marine mammals are unknown...

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Long-term impacts of OCS seismic-survey noise on the hearing abilities of individual marine mammals are unknown, and information about the hearing capabilities of large baleen whales is mostly lacking. As noted previously, the assumption is made that the area of greatest hearing sensitivity is at frequencies known to be used for intraspecific communication. However, because real knowledge of sound sensitivity is lacking, we believe it is prudent to assume in our analyses that sensitivities shown by one species of baleen whale also could apply to another. This reasonable approach provides the means to infer possible impacts on other species (such as the fin whale), especially when using studies on a species such as the humpback, which uses a large sound repertoire in intraspecific communication.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Long-term impacts of OCS seismic-survey noise on the hearing abilities of individual marine mammals are unknown, and information about the hearing capabilities of large baleen whales is mostly lacking.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

It is not known whether (or which) marine mammals can . . . and do adapt their vocalizations to background noise.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

No information was available regarding the time required for these whales to return to normal behavior.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-97

Actual Statement:

Several summaries related to the potential effects of seismic surveys have been written (Richardson et al., 1995a,b; McCauley et al., 2000; Gordon et al., 1998, 2004). Gordon et al. (1998:Sec. 6.4.3.1) summarized that: "Given the current state of knowledge, it is not possible to reach firm conclusions on the potential for seismic pulses to cause...hearing damage in marine mammals." Later in this review, they reach the same conclusion about the state of knowledge about the potential to cause biologically significant masking. "This review has certainly emphasized the paucity of knowledge and the high level of uncertainty surrounding so many aspects of the effects of sound on marine mammals" (Gordon et al., 1998:Sec. 6.12). While uncertainty is reduced, the statements above are still accurate.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-117

Actual Statement:

The effects of oil contacting skin are largely speculative, as there is no information about how long spilled oil will adhere to the skin of a free-ranging whale.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-118

Actual Statement:

The potential effect of crude oil on the function of the cetacean blowhole is unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that if oil contacted cetacean blowholes, significant impacts would occur. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-118

Actual Statement:

There is great uncertainty about the potential effects of ingestion of spilled oil on bowheads, especially on bowhead calves. Decreased food assimilation could be particularly important in very young animals, those that seasonally feed, and those that need to put on high levels of fat to survive their environment.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that if oil were ingested by bowheads, significant impacts would occur. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-118

Actual Statement:

It is not known if bowheads would leave a feeding area where prey was abundant following a spill.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to one of many varieties of potential adverse effects that the analysis already assumes could occur under certain circumstances. The analysis assumes that significant impacts could occur regardless of whether bowheads leave a feeding area where prey was abundant following a spill. Neither the probability or severity of these impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-118

Actual Statement:

Lambertsen et al. (2005) concluded that the current state of knowledge of how oil would affect the function of the mouth of right whales and bowheads can be considered poor, despite considerable past research on the effects of oil on cetaceans.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-118

Actual Statement:

They also concluded that their results highlight the uncertainty about how rapidly oil would depurate at the near zero temperatures of arctic waters and whether baleen function would be restored after oiling.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-118

Actual Statement:

Earlier studies on baleen fouling were summarized by Geraci (1990) who, with colleagues, had also undertaken studies of the effects of oil on baleen function. Geraci (1990) noted that while there was a great deal of interest in the possibility that residues of oil may adhere to baleen plates so as to block the flow of water and interfere with feeding, the concerns are largely speculative.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-119

Actual Statement:

The potential effects to bowheads of exposure to PAC's through their food are unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no connection between the potential adverse impact and the action alternatives. Bowheads can accumulate PACs through their foods across their entire range over their entire lifetime regardless of the lease sale decision. The Proposed Action would not contribute appreciably to contamination of bowheads. This information, therefore, is not relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-120

Actual Statement:

There is a paucity of information about whether bowhead whales may be temporarily displaced from areas affected by an oil spill or cleanup operations.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-121

Actual Statement:

Primarily because of the uniqueness of the bowhead and its apparently obligate use of spring lead and polynyas as its migratory path between wintering and summering grounds, MMS is uncertain of the potential severity of impact should a large oil spill occur within such a system, especially if spring migration were underway and hundreds of females were calving in or near those leads.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that if spilled oil entered the spring lead and polynya systems, significant impacts could occur. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-121

Actual Statement:

The effects of an oil spill on cetacean newborns or other calves and the potential effects of contact or detection of spilled oil by near-term, or post-partum females are not known.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that if oil contacted newborn, calf, near-term, or post-partum whales, then significant impacts would occur. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-121

Actual Statement:

The factors associated with the presence of such groups are not yet clear. It is not known if they would leave the area heavily contaminated with crude oil.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-121

Actual Statement:

Variability in the distribution of bowhead whales in the Beaufort Sea over time and among years, and lack of recent data on bowhead seasonal distribution and abundance in the Chukchi Sea makes attempts to quantitatively model the numbers of whales that might be contacted by oil problematic.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Actual Statement:

[I]t is difficult to predict the impact of a large spill on either humpback whales or especially on fin whales. Based on literature on other mammals indicating severe adverse effects of inhalation of the toxic aromatic components of fresh oil, mortality of cetaceans could occur if they surfaced in large quantities of fresh oil. However, if such mortality occurred, it would be not be consistent with many, perhaps most, published findings of expected impacts of oil on cetaceans. The potential for there to be long-term sublethal (for example, reduced body condition, poorer health, or longer dependency periods), or lethal effects from large oil spill on cetaceans essentially is unknown. There are no data on cetaceans adequate to evaluate the probability of such effects.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Actual Statement:

Geraci and St. Aubin (1990) stated that the notable weakness in modeling is that there is no information on the type and duration of oil exposure required to produce an effect.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-122

Actual Statement:

There are no data or other information available that would suggest that there could be a population level effect on fin whales from any activity or event, such as an oil spill, that could result from the activities resulting from Sale 193.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of data indicating that a population level effect could occur does not qualify as missing information relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-123

Actual Statement:

The response of bowhead whales to construction in high use areas is unknown and is expected to vary with the site and the type of facility being constructed. Similarly, the long-term response of bowheads to production facilities other than gravel islands located at the southern end of the migration corridor is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis concludes that the only potential cause of significant adverse effects to marine mammals from the Proposed Action would be a large oil spill. Potential impacts from development would rise to a level of "significant adverse". Additional data on bowhead response to construction in high use areas would not be relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

The observed response of bowhead whales to seismic noise has varied among studies. The factors associated with variability are not entirely clear.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative (including seismic activities) would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

In conclusion, there is uncertainty about effects on bowheads (or any large cetacean) in the event of a large oil spill. There are, in some years and in some locations, relatively large aggregations of feeding bowhead whales within the proposed lease-sale area. If a large amount of fresh oil contacted a significant portion of such an aggregation, effects potentially could be greater than typically would be assumed and we cannot rule out population-level effects if a large number of females and newborn or very young calves were contacted by a very large amount of fresh crude oil.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-125

Actual Statement:

There is great uncertainty about the effects of fresh crude oil on cetacean calves.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-126

Actual Statement:

There are several areas historically documented to be important to marine and coastal birds in the proposed lease sale area. These areas, as well as the entire proposed lease sale area, lack site-specific data on habitat use patterns, routes and timing to assess impacts. For many species, the most recent data is between 15 and 30 years old, making accurate analysis difficult.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While site-specific data on habitat use patterns, routes and timing are certainly useful in assessing impacts, this information is not essential to a reasoned choice among alternatives in this case and at this stage of the decision-making process. Much information is already known on the general habits of the many species of birds that use the Chukchi Sea. This level of available information is sufficient to support sound scientific judgments and reasoned managerial decisions, even in the absence of additional data of this type. The protections that these birds receive under the MBTA will serve to preclude or reduce impacts. Also, one should remember the 4-stage OCSLA process at work here. The current decision to be made is at step 2 of the process, the lease sale stage, which is quite programmatic in nature. Certain site- and project-specific can only be known at later steps in this process. Any appropriate additional mitigation measures can and will be developed at those later stages, when important information about project locations and details can be known.

Page Number: IV-127

Actual Statement:

Few studies have assessed the effects of seismic surveys on marine birds and waterfowl.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

This item does not identify any missing information relevant to reasonably foreseeable significant adverse effects. A low number of studies on an issue does not equate to missing information.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-127

Actual Statement:

Seismic airgun pulses have the potential to physically harm or kill diving birds. The threshold for physiological damage, namely to the auditory system, for marine birds is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS's thorough analysis of potential impacts to birds, including birds that engage in diving, indicated that use of airguns did not pose the potential for any significant adverse effects. Additional information on the threshold for physiological damage to diving birds is therefore not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-127

Actual Statement:

it is unclear whether changes in diving frequency were due to disturbance from seismic vessels or local abundance of prey items.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects from disturbance of diving frequency. Uncertainty as to whether changes in diving frequency could be from seismic vessels or local abundance of prey items is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-130

Actual Statement:

Data regarding bird behavior around drill ships has not been published, but reactions may be similar to seismic surveys where birds likely would avoid diving within a certain distance of the drill ship because of underwater noise and other rig activity.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis does not identify any reasonably foreseeable significant adverse effects from disturbance of diving activities. Additional data regarding bird behavior around (specifically) drill ships is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-130

Actual Statement:

Potential avenues of disturbance associated with the Proposed Action during development include construction of a production platform, an onshore base, pipelines, and roads; gravel mining/transport; pipeline maintenance; and oil-spill-response training. The location of these facilities is unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While the location of such facilities could potentially be relevant to reasonably foreseeable significant adverse effects, the structure of the 4-stage OCSLA review process is such that the specific of potential facilities cannot be known at this point in time. Once identified during a later review stage, this information will be used to inform site-specific reviews and to reduce and/or avoid adverse impacts. This process would apply under each action alternative. In sum, specific locations of future facilities is not essential to a reasoned choice among alternatives at this stage, which is more programmatic in nature.

Page Number: IV-132

Actual Statement:

The current distribution and abundance of these predators along the Chukchi Sea coast are unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS's thorough analysis of potential impacts to birds did not identify predators as a potential source of significant adverse effects. Additional information on the distribution and abundance of bird predators along the Chukchi coast is therefore not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-133

Actual Statement:

It is unknown if exposed adults could become permanently sterilized.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on whether exposed adult birds could become permanently sterilized is not essential to a reasoned choice among alternatives.

Page Number: IV-133

Actual Statement:

The effects of exposure can range from lethal to sublethal, although acute exposure can often lead to lethal effects. The true numbers of birds killed by acute toxicity often are difficult to document, because many birds do not wash up on shore or are difficult to detect by aerial surveys. Sublethal effects are especially difficult to assess in wild birds due to the wide variety of factors that could lead to such things as reproductive impairment or susceptibility to disease. For example, sublethal effects from oil could lead to immuno-suppression and, therefore, increase susceptibility to disease. However, birds often die from disease without any known prior exposure to petroleum. Accordingly, it is often difficult to determine whether a bird died to sublethal effects of oil or simply from a disease.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

This piece of incomplete information pertains to quantification of potential impacts that may occur in the unlikely event of a major oil spill. It is well understood that the environmental impacts associated with a major oil spill could be quite severe, to birds as well as many other environmental resources. These impacts are explained in great detail throughout Chapter 4 of the FEIS as well as the SEIS. Potential impacts are nearly identical under each action alternative (i.e. Alternatives 1, 3 and 4.) The probability of such an event occurring is also identical under each action alternative. It is also well understood that no major oil spills or spill-related impacts could result from a selection of the No Action Alternative. In light of these considerations, the decision-maker already has sufficient information regarding the relative probability and various impacts of a major oil spill to allow a reasoned choice among alternatives, with or without this particular piece of incomplete information. Although the missing information regards a very important issue, it is not essential for a reasoned choice among lease sale alternatives.

Page Number: IV-140

Actual Statement:

Yellow-billed loons in the Chukchi Sea are at particular risk due to their low numbers and low reproductive rate. The species is little studied and basic biological information (such as the seasonal distribution of immature and non-breeding yellow-billed loons) is unknown. Additional research could improve our understanding of the vulnerabilities of the yellow-billed and other loons using nearshore areas of the Chukchi Sea and western Beaufort Sea.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While site-specific data on the seasonal distribution of immature and non-breeding yellow-billed loons would be useful in assessing impacts, this information is not essential to a reasoned choice among alternatives in this case and at this stage of the decision-making process. Much information is already known on the general distribution of yellow-billed loon in the Chukchi Sea. This level of available information is sufficient to support sound scientific judgments and reasoned managerial decisions, even in the absence of additional data of this type. The protections that these birds receive under the MBTA (and now as a Candidate species under the ESA) will serve to preclude or reduce impacts. Also, one should remember the 4-stage OCSLA process at work here. The current decision to be made is at step 2 of the process, the lease sale stage, which is quite programmatic in nature. Certain site- and project-specific can only be known at later steps in this process. Any appropriate additional mitigation measures can and will developed at those later stages, when important information about project locations and details can be known.

Page Number: IV-140

Actual Statement:

Collisions are not documented for shearwaters, but these types of events typically are poorly documented.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The absence of data indicating shearwater mortality from striking vessels/structures does not qualify as missing information and is not relevant to reasonably foreseeable adverse effects on the human environment.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-142

Actual Statement:

The number of birds that could be affected at sea during spring or fall migration is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS does not anticipate any potential for significant adverse effects on common eiders, even in the event of a large oil spill. Thuse statement does not indiciate any missing information relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-142

Actual Statement:

The portion of Chukchi Sea kittiwakes in the proposed lease-sale area is unknown. Seasonal areas of concentration, if any, are unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While more detailed understanding of seasonal concentrations (i.e. knowing the exact portion of the Chukchi Sea population in the proposed lease-sale area) if kittiwakes would be helpful, this information is not essential to a reasoned choice among alternatives in this case and at this stage of the decision-making process. Much information is already known on the general habits of kittiwakes in the Chukchi Sea. This level of available information is sufficient to support sound scientific judgments and reasoned managerial decisions, even in the absence of additional data of this type. The protections that these birds receive under the MBTA and, more notably, the ESA, will serve to preclude or reduce impacts. Also, one should remember the 4-stage OCSLA process at work here. The current decision to be made is at step 2 of the process, the lease sale stage, which is quite programmatic in nature. Certain site- and project-specific can only be known at later steps in this process. Any appropriate additional mitigation measures can and will be developed at those later stages, when important information about project locations and details can be known.

Page Number: IV-142

Actual Statement:

These areas would be closer to potential sites of a development platform, and king eiders would be contacted more quickly by an oil spill originating offshore than birds closer to shore. King eiders have been observed in Peard Bay and, though their abundance is unknown, it probably is less than common eiders based on surveys in the early 1980's by Kinney (1985). The effects of oil exposure would be similar to common eiders, but the number of birds affected likely would be less in Peard Bay and Kasegaluk Lagoon. The number of birds that could be affected at sea during spring or fall migration is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS did not identify any reasonably foreseeable significant adverse effects to king eiders, even in the unlikely event of a large oil spill. The specific types of information regarding king eiders referenced in the item here are thus not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-143

Actual Statement:

Current population estimates at these colonies are unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While a more current population estimate for colonies at Cape Thompson and Cape Lisburne would be useful, this information is not essential to a reasoned choice among alternatives in this case and at this stage of the decision-making process. Much information is already known on the general habits of seabirds in the Chukchi Sea. This level of available information is sufficient to support sound scientific judgments and reasoned managerial decisions, even in the absence of additional data of this type. The protections that these birds receive under the MBTA will serve to preclude or reduce impacts. Also, one should remember the 4-stage OCSLA process at work here. The current decision to be made is at step 2 of the process, the lease sale stage, which is quite programmatic in nature. Certain site- and project-specific can only be known at later steps in this process. Any appropriate additional mitigation measures can and will developed at those later stages, when important information about project locations and details can be known.

Page Number: IV-143

Actual Statement:

Reliable estimates of the number of phalaropes using these two locations are unavailable;

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

As this statement indicates, there will be some level of incomplete information on current numbers of phalaropes at various locations. However, there still exists sufficient information to support sound scientific judgments and reasoned managerial decisions regarding potential impacts to phalaropes under each Chukchi Sea lease sale alternative. Precise and up-to-the-minute population counts are not essential to a reasoned choice among alternatives at this relatively programmatic stage. It should also be remembered that subsequent environmental reviews under later OCSLA review stages will be able to consider more current information regarding specific project locations, and thus provide a more robust review than is possible at the lease sale stage.

Actual Statement:

Dunlins are another prominent species in Kasegaluk Lagoon and Peard Bay in late summer and fall. As with other species of shorebirds and waterfowl, a spill during periods of peak abundance could impact large numbers of dunlins. Less is known about the numbers, timing, and patterns of habitat use of Kasegaluk Lagoon and Peard Bay by bar-tailed godwits but, given their recent population declines, effects of an oil spill could be particularly important.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS analysis forecasted no significant adverse effects to bar-tailed godwits, even during the unlikely event of a large oil spill. Any additional information on the numbers, timing, and patterns of use of Kasegaluk Lagoon and Peard Bay by these birds would not be relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Despite the importance of these areas, as well as the entire Chukchi Sea within the proposed lease-sale area, little recent site-specific data are available on habitat-use patterns, routes, and timing to assess impacts. For many species, the most recent data are between 15 and 30 years old, making accurate analysis difficult. Because of this long data gap, it is unknown if population abundance or distribution of many species have changed.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While additional recent and site-specific data on habitat-use patterns, routes and timing would certainly be useful in assessing impacts, this information is not essential to a reasoned choice among alternatives in this case and at this stage of the decision-making process. Much information is already known on the general habits of the many species of birds that use the Chukchi Sea. This level of available information is sufficient to support sound scientific judgments and reasoned managerial decisions, even in the absence of additional data of this type. The protections that these birds receive under the MBTA will serve to preclude or reduce impacts. Also, one should remember the 4-stage OCSLA process at work here. The current decision to be made is at step 2 of the process, the lease sale stage, which is quite programmatic in nature. Certain site- and project-specific can only be known at later steps in this process. Any appropriate additional mitigation measures can and will be developed at those later stages, when important information about project locations and details can be known.

Actual Statement:

Marine and coastal birds could be exposed to a variety of potential negative effects during seismic surveys, exploration drilling, and production including disturbances, collisions, habitat loss, petroleum exposure, and exposure to toxic contamination. The greatest potential for substantial adverse impacts typically would arise from collisions, aircraft disturbance, and large and chronic low-volume spills in important coastal bird habitats. These areas are Kasegaluk Lagoon, Ledyard Bay, Peard Bay, barrier islands, the spring open-water lead system, and the seabird-nesting colonies at Cape Lisburne and Cape Thompson. Despite the importance of these areas, as well as the entire Chukchi Sea within the proposed lease-sale area, little recent site-specific data are available on habitat-use patterns, routes, and timing to assess impacts. For many species, the most recent data are between 15 and 30 years old, making accurate analysis difficult. Because of this long data gap, it is unknown if population abundance or distribution of many species have changed.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While additional recent and site-specific data on habitat-use patterns, routes and timing would certainly be useful in assessing impacts, this information is not essential to a reasoned choice among alternatives in this case and at this stage of the decision-making process. Much information is already known on the general habits of the many species of birds that use the Chukchi Sea. This level of available information is sufficient to support sound scientific judgments and reasoned managerial decisions, even in the absence of additional data of this type. The protections that these birds receive under the MBTA will serve to preclude or reduce impacts. Also, one should remember the 4-stage OCSLA process at work here. The current decision to be made is at step 2 of the process, the lease sale stage, which is quite programmatic in nature. Certain site- and project-specific can only be known at later steps in this process. Any appropriate additional mitigation measures can and will developed at those later stages, when important information about project locations and details can be known.

Actual Statement:

Based on the paucity of information available on marine mammal ecology, and specifically on habitat use patterns, in the Chukchi Sea and based on the lack of specific information regarding the location of future developments, we are unable to determine at this time if significant impacts would or would not occur to marine mammal populations in the project area as a result of the Proposed Action.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

As this general statement indicates, there will be some level of incomplete information on marine mammal ecology in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. Activities with the potential to affect marine mammals will be subject to additional BOEM as well as NMFS and/or FWS review processes. Appropriate mitigation measures can and will be applied as proposals for specific activities are submitted. This multi-stage process permit more detailed review of each proposal, and development of more tailored mitigation measures. As per the MMPA and ESA, significant impacts must be avoided. This separate, thorough review and minimized potential for significant impacts is common to all alternatives. In light of the above, any "incomplete information" regarding marine mammal ecology and specific locations of future developments is not essential to a reasoned choice between alternatives at the lease sale stage.

Actual Statement:

Careful mitigation can help reduce the effects of future industrial developments and their accumulation through time. However, the effects of full-scale industrial development of the waters of the Chukchi Sea likely would accumulate through displacement of marine mammals from their preferred habitats, increased mortality, and decreased reproductive success. Because of the lack of data on which to base informed decisions, it is unknown if noise introduced into the environment from industrial activities, including drilling and seismic operations, will have an adverse impact on nonendangered and nonthreatened marine mammals in the Proposed Action area. Increasing vessel traffic in the Northwest Passage, defined as the marine route between the Pacific and Atlantic oceans through the Arctic Ocean across the top of North America, which includes the Proposed Action area, increases the risks of oil and fuel spills and vessel strikes of marine mammals.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

Sufficient information about marine mammals response to development and noise is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. Activities with the potential to affect marine mammals, such as drilling and seismic operations, will be subject to additional BOEM as well as NMFS and/or FWS review processes. Appropriate mitigation measures can and will be applied as proposals for specific activities are submitted. This multi-stage process permit more detailed review of each proposal, and development of more tailored mitigation measures. As per the MMPA and ESA, significant impacts must be avoided. This separate, thorough review and minimized potential for significant impacts is common to all alternatives. In light of the above, any "incomplete information" regarding potential noise impacts from future projects is not essential to a reasoned choice between alternatives at the lease sale stage.

Actual Statement:

It is uncertain how seismic surveys potentially might impact seal-food resources in the immediate vicinity of the survey.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The thorough FEIS analysis of potential effects of seismic surveys did not identify impacts to seal-food resources in the immediate vicinity of a survey to be a notable concern. This item is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Although it is unlikely that airgun operations during most seismic surveys would cause PTS in marine mammals, caution is warranted given the limited knowledge about noise-induced hearing damage in marine mammals.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Seismic operations are expected to create significantly more noise than general vessel and icebreaker traffic; however, there are no data available to evaluate the potential response of walrus to seismic operations.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Quantitative research on the sensitivity of walruses to noise has been limited because no audiograms (a test to determine the range of frequencies and minimum hearing threshold) have been done on walruses.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Although the hearing sensitivity of walrus is poorly known, source levels are thought to be high enough to cause temporary hearing loss in other species of pinnipeds.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-150

Actual Statement:

Overall, little research has been done to study the effects of seismic activity, and related vessel and air traffic, on the behavior of toothed whales other than the sperm whale.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities (including the seismic activities and related vessel and air traffic) under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from certain activities, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-151

Actual Statement:

Given the greater potential for anthropogenic-noise impacts on baleen whales, more research has been done to focus on potential effects on baleen whales than with toothed whales (although data is still considered limited).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

This statement does not indicate missing information relevant to reasonably foreseeable adverse effects on the human environment.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-151

Actual Statement:

No studies are available specific to the effects of seismic-survey noise on minke whales, but the potential for impacts would be considered within the range of other baleen whales. Also, no known long-term impacts have been documented on gray and minke whale behavior as a result of seismic activity.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

See response to Item 4C.88.a, above.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-152

Actual Statement:

Unfortunately, it has not been possible to predict the type and magnitude of marine mammal responses to the variety of disturbances caused by oil and gas operations and industrial developments in the Arctic. More importantly, it has not been possible to evaluate the potential effects on populations.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

The need to rely on indirect methods of assessing the environmental impact of human activity on marine mammals is a recurring problem (Inglis and Gust, 2003). Impact assessments for cetaceans typically emphasize immediate behavioral responses to human activities (Samuels and Bejder, 2004), the biological relevance of which is rarely known (Corkeron, 2004).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, additional information on the biological relevance of cetacean's immediate behavioral responses to human activities is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

[M]onitoring plans typically emphasize readily obtainable, short-term behavioral measures that can be directly related to disturbance factors (Bejder et al., 2006). However, it is rarely known in what ways short-term responses translate to longer term changes in reproduction, survival, or population size (Gill, Norris, and Sutherland, 2001; Beale and Monaghan, 2004a), and it is seldom possible to infer biological significance based on short-term behavioral observations.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissable method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, the ability to infer biological significance of short-term behavioral observations is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Without historical data on distribution and abundance, it is not possible to measure the impacts of an oil spill on marine mammals.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-157

Actual Statement:

Determining oil-spill effects on walrus prey species is difficult. Clam-patch size and density are highly variable, and such information for high-latitude mollusks is sparse and highly variable (Ray et al., 2006).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration and extent of impacts (including potential impacts on high-latitude mollusks), while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-158

Actual Statement:

[T]he potential for long-term sublethal (for example, reduced body condition, poorer health, or longer dependency periods), or lethal effects from large oil spill on cetaceans is unknown. However, observations of cetaceans behaving in a lethargic fashion or having labored breathing has been documented in more than one species, including in gray whales after the EVOS, in which large numbers of individuals were subsequently found dead.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-159

Actual Statement:

The potential effect of crude oil on the function of the cetacean blowhole is unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-159

Actual Statement:

Although there is very little definitive evidence linking cetacean death or serious injury to oil exposure,

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of evidence of an effect does not constitute missing information relevant to a reasonably foreseeable significant adverse effect.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-160

Actual Statement:

The potential for there to be long-term sublethal (for example, reduced body condition, poorer health, reduced immune function, reduced reproduction or longer dependency periods) effects on large cetaceans from a large oil spill essentially is unknown. There are no data on large cetaceans adequate to evaluate the probability of sublethal effects.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-160

Actual Statement:

The effects of oil contacting skin largely are speculative.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that if oil contacted cetacean skin, significant impacts would occur. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-161

Actual Statement:

A large oil spill could have significant impacts to beluga prey species, including anadromous and coastal spawning species such as salmon (Sec. IV.C.1.d). If a significant impact to anadromous and coastal spawning species occurred, the effects on belugas would be detrimental, but the magnitude unknown.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

This piece of incomplete information pertains to potential impacts that may occur in the unlikely event of a major oil spill. It is well understood that the environmental impacts associated with a major oil spill could be quite severe, in terms of beluga prey species and beluga themselves. These impacts are explained in great detail throughout Chapter 4 of the FEIS as well as the SEIS. Potential impacts are nearly identical under each action alternative (i.e. Alternatives 1, 3 and 4.) The probability of such an event occurring is also identical under each action alternative. It is also well understood that no major oil spills or spill-related impacts could result from a selection of the No Action Alternative. In light of these considerations, the decision-maker already has sufficient information regarding the relative probability and various impacts of a major oil spill to allow a reasoned choice among alternatives, with or without this particular piece of incomplete information. Although the missing information regards a very important issue, it is not essential for a reasoned choice among lease sale alternatives.

Page Number: IV-161

Actual Statement:

The effects of a large oil spill and subsequent exposure of whales to fresh crude oil are uncertain, speculative, and controversial.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-161

Actual Statement:

There are no data available on which to evaluate the potential effect of a large or very large spill on baleen whale calves, on females who are very near term or who have just given birth, or on females accompanied by calves of any age.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-161

Actual Statement:

There is great uncertainty about the effects of fresh crude oil on cetacean calves.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that if cetacean calves were exposed to fresh crude, significant impacts would occur. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-161

Actual Statement:

There is some uncertainty and disagreement within the scientific community on the results of studies on the impacts of the EVOS on large cetaceans (for example, Loughlin, 1994; Dahlheim and Matkin, 1994; Dahlheim and Loughlin, 1990).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The analysis already assumes that a large oil spill would lead to significant impacts to cetaceans if they or their habitats are exposed. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives. This is especially true where the uncertainty alluded to pertains specifically to the results of past studies of other areas.

Page Number: IV-162

Actual Statement:

In light of the uncertainty over the potential impacts of exploration and development activities, the earliest possible establishment of long-term monitoring programs for vulnerable species in the project area should be pursued. The design of long-term monitoring should take into account the likely size of any effect and the probability of detecting it within a reasonable time span (IWC, 2006).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

This item simply makes a recommendation based on the premise that there is certain incomplete information, and does not indicate any connection between allegedly missing information and any significant adverse impacts.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-162

Actual Statement:

In conclusion, there is uncertainty about effects on cetaceans in the event of a large spill.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The analysis already assumes that a large oil spill would lead to significant impacts to cetaceans if they or their habitats are exposed. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-163

Actual Statement:

Understanding the distribution and timing of movements of belugas is important for planning lease sales in the Chukchi Sea and designing possible mitigation measures. Late-summer distribution and fall-migration patterns are poorly known, wintering areas effectively are unknown, and areas that are particularly important for feeding have not been identified (Suydam, Lowry, and Frost, 2005).

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

While additional information on the distribution and timing of movements of belugas would be useful, this information is not essential to a reasoned choice among alternatives in this case. Much information is already known on the general habits of the many species of birds that use the Chukchi Sea. This level of available information is sufficient to support sound scientific judgments and reasoned managerial decisions regarding formulation and selection of lease sale alternatives. The protections that this species receives under the MMPA will serve to preclude or reduce impacts under all action alternatives.

Page Number: IV-165

Actual Statement:

With the limited background information available regarding large oil spills in the offshore arctic environment, the outcome of a large oil spill is uncertain.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

This piece of incomplete information pertains to potential impacts that may occur in the unlikely event of a major oil spill. It is well understood that the environmental impacts associated with a major oil spill could be quite severe, to polar bears as well as many other environmental resources. These impacts are explained in great detail throughout Chapter 4 of the FEIS as well as the SEIS. Potential impacts are nearly identical under each action alternative (i.e. Alternatives 1, 3 and 4.) The probability of such an event occurring is also identical under each action alternative. It is also well understood that no major oil spills or spill-related impacts could result from a selection of the No Action Alternative. In light of these considerations, the decision-maker already has sufficient information regarding the relative probability and various impacts of a major oil spill to allow a reasoned choice among alternatives, with or without this particular piece of incomplete information. Although the missing information regards a very important issue, it is not essential for a reasoned choice among lease sale alternatives.

Page Number: IV-166

Actual Statement:

Coastal areas provide important denning habitat for polar bears. Terrestrial denning areas for bears of the CBS polar bear stock are less well understood than those for the SBS polar bear stock.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the CBS stock denning areas compared to the SBS stock. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Additional information on this topic is not essential to a reasoned choice among alternatives. Moreover, additional processes (more NEPA during subsequent OCSLA stages, ESA Section 7) will help ensure lack of significant impacts under each alternative if/when projects are sited.

Page Number: IV-168

Actual Statement:

Although no recent population estimate is available for the CBS population, all available data indicate that it is already in decline and that current levels of illegal harvest in Russia are unsustainable.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the exact amount of illegal harvest of polar bears in Russia; however, the important information is that specialists have agreed to a population size and trend for management purposes. Such information was used to support sound scientific judgments and reasoned managerial decisions. Additional information on this point is not essential for a reasoned choice among alternatives at the lease sale stage. Furthermore, the missing information pertains to impacts that are common to all alternatives, a fact which tends to reduce the utility of such information to the decision-maker.

Page Number: IV-194

Actual Statement:

Bowheads respond to drilling noise at different distances depending on the types of platform from which the drilling is occurring. Data indicate that many whales can be expected to avoid an active drillship at 10-20 km or possibly more. The response of bowhead whales to construction in high-use areas is unknown and is expected to vary with the site and the type of facility being constructed. Similarly, the long-term response of bowheads to production facilities other than gravel islands located at the southern end of the migration corridor is unknown

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill, a separate issues from the construction discussed in the item here. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-194

Actual Statement:

The response of bowhead whales to construction in high-use areas is unknown and is expected to vary with the site and the type of facility being constructed.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill, a separate issues from the construction discussed in the item here. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-216

Actual Statement:

It is unknown what effects an oil spill would have on bowhead whales, but it is likely that some whales would experience temporary, nonlethal effects from the oiling of skin, inhaling hydrocarbon vapors, ingesting oil contaminated prey, fouling of their baleen, losing their food source, and temporary displacement from some feeding areas.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-217

Actual Statement:

Little information is known about oil-spill effects on seals although any large oil spill in nearshore marine or coastal riverine environments could cause injury or death to these sea mammals, potentially cause them to move off of their normal course, and make them unavailable for subsistence harvest.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that a large oil spill would lead to significant impacts. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-217

Actual Statement:

There is uncertainty about effects on bowheads (or any large cetacean) in the event of a large spill.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The analysis already assumes that a large oil spill would lead to significant impacts to cetaceans if they or their habitats are exposed. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-217

Actual Statement:

For beluga whales, there also is uncertainty about effects on them in the event of a very large spill.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the level of effects of marine mammals to oil contact. This information is important; however, it pertains to a small subset of potential adverse effects that is already assumed to occur under particular circumstances, i.e., those that may occur in the unlikely event of a large oil spill. For reasons discussed in many other responses, the decision-maker already has sufficient information regarding the relative probability and various impacts of an oil spill to allow a reasoned choice among alternatives.

Page Number: IV-218

Actual Statement:

Given a lack of contemporary abundance and distribution information, large oil spill effects on rare or unique species (including potential extirpation) could occur, but would likely go unnoticed or undetected.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the effects of oil on rare fish species in the Arctic. This information is important; however, it pertains to a small subset of potential adverse effects that is already assumed to occur under particular circumstances, i.e., those that may occur in the unlikely event of a large oil spill. For reasons discussed in many of these responses, the decision-maker already has sufficient information regarding the relative probability and various impacts of an oil spill to allow a reasoned choice among alternatives.

Page Number: IV-256

Actual Statement:

The disparate mortality rates are less well understood.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no connection between disparate mortality (i.e. cancer) rates among local people and any reasonably foreseeable significant adverse effects from the Proposed Action.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-258

Actual Statement:

Because there are no available data on local fine-particulate concentrations, no data on hazardous air pollutants, and little data on intraregional variation in other USEPA-criteria pollutants, it is impossible to determine the possible contribution of these environmental factors.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The possible contribution of these environmental factors has no connection to the Proposed Action and has no relevance to any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-265

Actual Statement:

However, there are significant gaps in the data for the period 1979-1989.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no discernible connection between this incomplete information and any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-269

Actual Statement:

However, because of the lack of data on marine mammal distributions and habitat use in offshore areas of the Chukchi Sea, it is uncertain what the level of effects would be in offshore areas.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

As this general statement indicates, there will be some level of incomplete information on marine mammal distribution and habitat use in offshore areas of the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. Activities with the potential to affect marine mammals will be subject to additional BOEM as well as NMFS and/or FWS review processes. Appropriate mitigation measures can and will be applied as proposals for specific activities are submitted. This multi-stage process permit more detailed review of each proposal, and development of more tailored mitigation measures. As per the MMPA and ESA, significant impacts must be avoided. This separate, thorough review and minimized potential for significant impacts is common to all alternatives. In light of the above, any "incomplete information" regarding marine mammal distribution and habitat use is not essential to a reasoned choice between alternatives at the lease sale stage.

Page Number: IV-32

Actual Statement:

Direct estimates or measurements of total recoverable concentrations of metals in discharged drilling muds are not available.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

As explained in the FEIS, there is no potential for the discharge of drilling muds to cause significant adverse effects. Additional information on metal concentrations is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

Page Number: IV-51

Actual Statement:

Because of the paucity of studies in the Chukchi Sea, a review of the available science and management literature shows that at present, there are no empirical data to document potential impacts from seismic surveys reaching a local population-level effect; also, the experiments conducted to date have not contained adequate controls in place to allow us to predict the nature of a change or that any change would occur. (see #3 above)

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The absence of data demonstrating population-level impacts does not constitute missing information relevant to reasonably foreseeable significant adverse impacts.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-54

Actual Statement:

While we cannot say with certainty the impacts of seismic surveys on fish feeding behavior, there is no present evidence that the behavioral impact of seismic surveys has a major effect on fish feeding, except perhaps in the immediate vicinity of an active survey vessel.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of data demonstrating a major effect does not qualify as missing information relevant to reasonably foreseeable significant adverse effects. The FEIS did not identify a possibility of significant adverse effects from these identified activities.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-60

Actual Statement:

Eggs deposited in the proximity of the contaminated substrate over a series of years likely would be exposed to oil (PAH's) retained in the substrate, as PAH's in weathered oil can be biologically available for long periods and very toxic to sensitive lifestages, subsequently leading to lethal and sublethal effects to those offspring of successive generations. It is not known what such a behavioral response may have on the dynamics of the population; however, the spawning site likely would be unavailable for use for multiple generations, depending on the sensitivity of the capelin to detecting contaminated substrates and how long the oil persists in the localized habitat.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to a small subset of adverse effects that is already assumed to occur under certain circumstances. The analysis already assumes that if oil contacted spawning locations, significant impacts would occur. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. Additional information on the myriad potential mechanism of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: IV-61

Actual Statement:

A number of diadromous species in the region have complicated life-history patterns that are not fully understood.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete understanding of the complicated life histories of diadromous fish species in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Additional information is not essential to a reasoned choice among alternatives.

Page Number: IV-61

Actual Statement:

Effects on recruitment would be particularly difficult to assess, because very few studies of offshore fishes have been made.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the recruitment patterns of all fishes of offshore areas of the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Moreover, additional processes (more NEPA during subsequent OCSLA stages, EFH consultation) will utilize site- and project-specific analysis to help ensure lack of significant impacts under each alternative. Thus additional information on recruitment patterns of offshore fish is not essential to a reasoned choice among alternatives at this stage of the process.

Page Number: IV-62

Actual Statement:

Although arctic cod can be extremely abundant in nearshore lagoonal areas, the importance of nearshore versus offshore environments to the lifecycle is not known (Craig et al., 1982). Although it is known that juvenile arctic cod associate with floating ice, it is unknown to what degree this association contributes to the development and survival of young fishes later recruiting to the breeding population. If early lifehistory stages of arctic cod were concentrated in nearshore environments, in patches in the open ocean, or under floating ice, they certainly would be more vulnerable to effects from an oil spill impacting such habitats.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the association of juvenile arctic cod and sea ice, especially as it pertains to survival and recruitment, in the Chukchi Sea. While potentially important, this information is not essential to a reasoned choice among alternatives at this time. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Additional review processes (NEPA, EFH) would take into account the more detailed site and project information which would be available at that time.

Page Number: IV-63

Actual Statement:

Also unknown are the distribution and abundance of spawning sites used by capelin in the Alaskan Arctic.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the distribution and abundance of capelin spawning sites in the Chukchi Sea. While potentially important, this information is not essential to a reasoned choice among alternatives at this time. Sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Additional review processes (NEPA, EFH) would take into account the more detailed site and project information which would be available at that time.

Page Number: IV-67

Actual Statement:

Although the mechanism for the apparent decline in smolt abundance is uncertain, the result of overescapement and too many salmon fry to be supported by the available prey may be the cause. The extent of the decline was speculative.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no connection between the uncertainty about the mechanism for the apparent decline in smolt abundance observed in a southern portion of Alaska and any reasonably foreseeable significant adverse effects here.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-72

Actual Statement:

While small-spills are required to be reported, the number of unreported spills is unknown. Not all spills would be expected to receive a spill-response. Overall, it is unclear whether, over the long-term and in the absence of a monitoring program to assess effects, any negative impacts to fish resources from chronic small spills would be detected.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of an indication that any small oil spills going unreported may or may not be causing impacts does not qualify as missing information relevant to reasonably foreseeable adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-74

Actual Statement:

A review of the available science and management literature shows that at present, there are no empirical data to document potential impacts from seismic surveys reaching a local population-level effect.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The absence of data demonstrating population-level impacts does not constitute missing information relevant to reasonably foreseeable significant adverse impacts.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-74

Actual Statement:

A review of the available science and management literature shows that at present, there are no empirical data to document potential impacts from seismic surveys reaching a local population-level effect. The experiments conducted to date have not contained adequate controls to allow us to predict the nature of a change or that any change would occur

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The absence of data demonstrating population-level impacts does not constitute missing information relevant to reasonably foreseeable significant adverse impacts.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: IV-81

Actual Statement:

Absent direct information on potential effects on baleen calves, we draw on more general mammalian literature about potential effects on very young individuals.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on the potential effects of oil on baleen whale calves in the project area. Such information is important; however, sufficient information (specifically the wealth of mammalian literature referenced for this analysis) is available to support sound scientific judgments and reasoned managerial decisions. Direct information on potential effects to baleen calves is not essential for a reasoned choice among alternatives at this stage. Further, impacts will be reduced and/or precluded through additional, site-specific review and ESA Section 7 consultation in the future.

Actual Statement:

There are multiple sources of uncertainty in our analyses. These include, but are not limited to uncertainty about the action: where seismic surveys will occur; how many surveys will occur; how much noise will be produced purposely by the firing of airguns; what the exact shape of related ancillary activities, such as support vessel type and activity will be; where exploration drilling could occur; where leases will be let; where a spill could occur; where production platforms and pipelines may be based; etc. More important, there is acknowledged (NRC, 2003, 2005; minutes from meetings of the Marine Mammal Commission Sound Advisory Panel, 2004, 2005 from their web site) scientific uncertainty about the potential effects of noise, especially repeated exposure to loud noise, on baleen whales. There is uncertainty and controversy regarding the potential effects of oil spills on large cetaceans. There are very few, if any, data available about potential effects of either noise or oil spills on cetacean calves. Lastly, and importantly, data are not available sufficient to characterize the current seasonal and temporal use of the Chukchi Sea Planning Area by bowheads and other whales, or to fully understand the importance of parts of the Beaufort Sea to bowhead whales. Thus, it is difficult to predict exposure in some parts of the area where the action could occur and to understand fully the potential effects of any exposure.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The first half of this statement contains general language which demonstrates some of the benefits of conducting multi-stage environmental review as per the four-stage OCSLA process. This information, while not essential at this stage, will be used at later stages to inform detailed environmental reviews and avoid impacts. The second half of this statement contains general language highlighting points of uncertainty within current science regarding whales and potential impacts to whales. There will be some level of incomplete information on the potential effects of oil exploration and development activities on baleen whales, including bowhead whale calves, in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions. Also, additional review processes (NEPA, ESA Section 7 consultation, etc.) will help ensure lack of significant impacts to these animals. Thus additional information is not essential to a reasoned choice among alternatives. Also, it should be noted that the only component of the Proposed Action that could significant effect whales is the small risk of a large oil spill. The probability of such an event, and the severity of its potential impacts, is constant between all action alternatives, which further reduces the utility of this information to the decision maker.

Actual Statement:

[T]here are few instances where data are sufficient to evaluate the total energy exposure of a marine mammal from a given source. At present, we do not have the data necessary to make such a determination or understand how it might change our analysis.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Despite the increasing concern and attention noted above, there still is uncertainty about the potential impacts of sound on marine mammals; on the factors that determine response and effects; and especially on the long-term, cumulative consequences of increasing noise in the world's oceans from multiple sources (NRC, 2003, 2005). The NRC (2005) concluded that it is unknown how or in what cases responses of marine mammals to anthropogenic sound rise to the levels of biologically significant effects. This group also developed an approach of injury and behavioral "take equivalents". These take equivalents use a severity index that estimates the fraction of a take experienced by an individual animal. This severity index is higher if the activity could be causing harassment at a critical location or during a critical time (e.g., calving habitat). Because we have uncertainty about exactly where and how much activity will occur, the recommendations from the NRC (2005) are qualitatively incorporated in MMSs analysis.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

While there is some general information available, evaluation of the impacts of noise on marine mammal species, particularly on cetaceans, is greatly hampered by a considerable uncertainty about their hearing capabilities and the range of sounds used by the whales for different functions (Richardson et al., 1995a; Gordon et al., 1998; NRC, 2003, 2005). This is particularly true for baleen whales. Very little is known about the actual hearing capabilities of the large whales or the impacts of sound on them, especially on them physically. While research in this area is increasing, it is likely that we will continue to have great uncertainty about physiological effects on baleen whales because of the difficulties in studying them. Baleen whale hearing has not been studied directly. There are no specific data on sensitivity, frequency or intensity discrimination, or localization (Richardson et al., 1995a). Thus, predictions about probable impacts on baleen whales generally are based on assumptions about their hearing rather than actual studies of their hearing (Richardson et al., 1995a; Gordon et al., 1998; Ketten, 1998).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Based on indirect evidence, at least some baleen whales are quite sensitive to frequencies below 1,000 Hz but can hear sounds up to a considerably higher but unknown frequency.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

even though there are no direct data from hearing tests on any baleen whale.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Little data are available about how, over the long term, most marine mammal species (especially large cetaceans) respond either behaviorally or physically to intense sound and to long-term increases in ambient noise levels. Large cetaceans cannot be easily examined after exposure to a particular sound source.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

There are no data on which to determine the kinds or intensities of sound that could cause a TTS in a baleen whale.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Repeated long exposures to intense sound or sudden onset of intense sounds generally characterize sounds that cause permanent threshold shift in humans. Ketten (1998) stated that age-related hearing loss in humans is related to the accumulation of permanent-thresholdshift and TTS damage to the ear. Whether similar age-related damage occurs in cetaceans is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Most experiments have looked at the characteristics (e.g., intensity, frequency) of sounds at which TTS and permanent threshold shift occurred. However, while research on this issue is occurring, it is still uncertain what the impacts may be of repeated exposure to such sounds and whether the marine mammals would avoid such sounds after exposure, even if the exposure was causing temporary or permanent hearing damage, if they were sufficiently motivated to remain in the area (e.g., because of a concentrated food resource).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Long-term impacts of OCS seismic-survey noise on the hearing abilities of individual marine mammals are unknown...

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Long-term impacts of OCS seismic-survey noise on the hearing abilities of individual marine mammals are unknown, and information about the hearing capabilities of large baleen whales is mostly lacking. As noted previously, the assumption is made that the area of greatest hearing sensitivity is at frequencies known to be used for intraspecific communication. However, because real knowledge of sound sensitivity is lacking, we believe it is prudent to assume in our analyses that sensitivities shown by one species of baleen whale also could apply to another. This reasonable approach provides the means to infer possible impacts on other species (such as the fin whale), especially when using studies on a species such as the humpback, which uses a large sound repertoire in intraspecific communication.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Long-term impacts of OCS seismic-survey noise on the hearing abilities of individual marine mammals are unknown, and information about the hearing capabilities of large baleen whales is mostly lacking.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

It is not known whether (or which) marine mammals can . . . and do adapt their vocalizations to background noise.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

No information was available regarding the time required for these whales to return to normal behavior.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

Several summaries related to the potential effects of seismic surveys have been written (Richardson et al., 1995a,b; McCauley et al., 2000; Gordon et al., 1998, 2004). Gordon et al. (1998:Sec. 6.4.3.1) summarized that: "Given the current state of knowledge, it is not possible to reach firm conclusions on the potential for seismic pulses to cause...hearing damage in marine mammals." Later in this review, they reach the same conclusion about the state of knowledge about the potential to cause biologically significant masking. "This review has certainly emphasized the paucity of knowledge and the high level of uncertainty surrounding so many aspects of the effects of sound on marine mammals" (Gordon et al., 1998:Sec. 6.12). While uncertainty is reduced, the statements above are still accurate.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Actual Statement:

It is not known to what extent local sources in Alaska contribute to arctic haze in the State.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no connection between the extent to which local sources in Alaska contribute to Arctic haze and any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-16

Actual Statement:

Emissions of nitrous oxide were not calculated due to a lack of information about emission factors; however, these emissions are expected to be much smaller than for the other greenhouse gases.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

No significant adverse effects from emissions of nitrous oxide are anticipated; thus, any missing information is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-19

Actual Statement:

There are no data available that indicate that, other than historic commercial whaling, any previous human activity has had a significant population-level adverse impact on the current status of BCB Seas bowhead whale or their recovery.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of an indication that any human activity has had a significant adverse impact on the current status of the BCB Seas bowhead or their recovery does not qualify as missing information relevant to reasonably foreseeable adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-20

Actual Statement:

Whether there are long-lasting behavioral effects from this activity are unknown, but overall habitat use appears to be relatively unaffected.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS did not identify any significant adverse effects to whales from subsistence whale hunting. The missing information is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-20

Actual Statement:

There are not sufficient data about past human activities, including, but not limited to, past offshore oil and gas related seismic surveys, or ice-management activities, to address whether there are any long-term impacts on behavior from such activities in either evaluation area.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS did not identify any significant adverse effects to bowheads from past offshore oil and gas related seismic surveys or ice-management activities. The missing information is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-20

Actual Statement:

[D]ata on other potential perturbations (e.g., past seismic surveys and oil spills) are not sufficient to clearly know the level of effects.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS did not identify any significant adverse effects to bowheads from past seismic surveys or oil spills. The missing information is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-20

Actual Statement:

The factors related to the variability in bowhead responsiveness to anthropogenic noise are unclear and other populations are not as well studied. It also is unclear whether there is a human-related cause underlying the high level (at least in some instances) of behavioral responsiveness to human noise of the bowhead whale.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities (including those producing relatively high levels of anthropogenic noise) under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from certain activities, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, any "incomplete information" on variability in bowhead responsiveness to anthropogenic noise is not relevant to any reasonable foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-20

Actual Statement:

Because the potential effects of some specific perturbations (large oil spills, repeated exposure to noise, shipping, etc.) are uncertain, an even greater level of uncertainty exists about the cumulative impact of all of the potential factors, especially over the long timeframes that must be considered for this species. While such uncertainty exists about the details of some but not all cumulative effects, it also is the case that the Western Arctic stock of bowheads is relatively very well studied and monitored.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

As the conclusion to this statement indicates, there is sufficient information is available to support sound scientific judgments and reasoned managerial decisions regarding the effect of these perturbations on bowheads. Additional information on these issues is not essential to a reasoned choice among alternatives.

Page Number: V-20

Actual Statement:

While other potential effectors primarily have the potential to cause, or to be related to, behavioral or sublethal adverse effects to this population, or to cause the deaths of a small number of individuals, little or no evidence exists of other common human-related causes of mortality.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of information indicating the existence of additional human-related causes of mortality does not qualify as missing information relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-21

Actual Statement:

Data are lacking about how far hunting-related sounds (e.g., the sounds of vessels and/or bombs) can propagate in areas where hunting typically occurs, but this is likely to vary with environmental conditions. It is not known if a whale issues an "alarm call" or a "distress call" after it, or another whale, is struck prior to reducing call rates.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no connection between the missing information and any reasonably foreseeable significant adverse effects associated with the Proposed Action or alternatives. The FEIS does not anticipate any significant adverse effects to marine mammals outside the unlikely event of a large oil spill. Additionally, subsistence hunting would occur to the same extent under all alternatives, a fact which tends to further reduce the utility of such information to the decision-maker here.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-21

Actual Statement:

However, information about long-term habitat avoidance occurring with present levels of activity is not available. Additionally, if, as reported above, whales become more "skittish" and more highly sensitized following a hunt, it may be that their subsequent reactions over the short-term to other forms of noise and disturbance are heightened by such activity. Data are not available that permit evaluation of this possible, speculative interaction.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There is some level of uncertainty regarding the speculative potential for short-term impacts to whales following hunts. However, sufficient information regarding whales behavior, avoidance patterns, etc are available to support sound scientific judgments and reasoned managerial decisions. It should also be noted that these possibilities have already been taken into account in the development of various alternatives and deferral areas. Enough is already known about this potential for impacts such that reasoned choices among alternatives can be made. Additional information is not essential.

Page Number: V-22

Actual Statement:

There are insufficient data to make reliable predictions of the effects of Arctic climate change on bowhead whales.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no connection between this missing information and any reasonably foreseeable significant adverse effects to bowheads identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-22

Actual Statement:

If climate changes occur, it is likely that shipping would increase throughout the range of the bowhead, especially in the southern portions of the Arctic Ocean. If commercial fisheries were to expand, bowhead whale death and or injury due to interactions with fishing gear, possibly injury and/or death due to incidental take in commercial fisheries, and temporary effects on behavior potentially could occur. There are, however, no data that would permit a quantitative prediction of the aforementioned possible effects.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of data on potential impacts to bowheads from commercial fishing is not relevant to any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-23

Actual Statement:

Noise associated with ships or other boats potentially could cause bowheads to alter their movement patterns or make other changes in habitat use. Clapham and Brownell (1999) summarized that "...effects of ship noise on whale behavior and ultimately on reproductive success are largely unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

This assertion, which appears in one particular study, does not qualify as missing information relevant to reasonably foreseeable significant adverse effects. Vessel noise is not anticipated to cause any significant adverse effects to bowheads.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-25

Actual Statement:

[R]ecent monitoring studies indicated that most fall migrating whales avoid an area with a radius about 20-30 km around a seismic vessel operating in nearshore waters; however, there are no data that indicate that such avoidance is long-lasting after cessation of the activity.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The absence of data indicating long-lasting avoidance following seismic survey does not qualify as missing information relevant to reasonably foreseeable significance adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-25

Actual Statement:

Available data . . . are inadequate to fully address issues about effects of past oil and gas activity specifically in the Chukchi Sea on bowhead behavior.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS did not identify any significant adverse effects to bowheads from past oil and gas activities in the Chukchi Sea. The missing information is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-25

Actual Statement:

[W]e cannot adequately assess potential effects on patterns or durations of bowhead habitat use. Because of the inadequacy of the data on activities, and because of the limitations inherent in studying large baleen whales, MMS was not able to assess whether there were any adverse health effects to individuals during the period of relatively intensive seismic survey activity in the 1980's.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no connection between this missing information and any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-25

Actual Statement:

However there are significant gaps in the data for the period 1979-1989 and very limited information was obtained on ice management (Wainwright, 2002).

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no discernible connection between ice management data from 1979-1989 and any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-26

Actual Statement:

Data on other activities, such as hunting activity, barge traffic, and shipping noise are incomplete. Thus, while it is clear there have been multiple noise and disturbance sources in the Beaufort Sea over the past 30 years, because of the incompleteness of data, even for the 1990's, for many types of activities, we cannot evaluate the cumulative effects on bowhead whales resulting from multiple noise and disturbance sources (e.g., 2D seismic in State and Federal waters, drilling, ice management, high-resolution acoustic surveys, vessel traffic, construction, geotechnical borehole drilling, aircraft surveys, and hunting). Because data also are incomplete for the Chukchi Sea, we reach the same general conclusions.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Activities under each action alternative would be required to comply with the Marine Mammal Protection Act, including its prohibition on "take". NMFS may grant authorizations for incidental take for activities having no more than a negligible effect on the species (or stock) in question, and that would not have an unmitigable adverse impacts on the availability of the marine mammals for subsistence uses. Also, permissible method of taking and requirements pertaining to monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat. The MMPA regulatory thresholds for take of marine mammals via noise err on the side of caution, and are designed to encompass a variety of potential direct and indirect effects. Take authorization generally incorporate project- or activity-specific mitigation measures to avoid or further reduce potential impacts. Despite the indication of uncertainty regarding the potential level of effect from anthropogenic noise, BOEM remains confident that the existing regulatory framework is sufficient to prevent noise impacts from having more than a negligible level of effect. A negligible level of effect as defined by the MMPA could not rise to "significance" as defined in Section IV.A.1. of the FEIS. The FEIS itself anticipates that significant adverse effects to marine mammals could only occur as a result of the unlikely event of a large oil spill. In light of these considerations, this item of "incomplete information" is not relevant to any reasonable foreseeable significant adverse effects. (It should also be noted that several marine mammal species receive additional protections against significant adverse effects from the Endangered Species Act.)

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-27

Actual Statement:

However, data are inadequate to fully evaluate potential impacts on whales during this period, including the duration of habitat use effects or numbers and types of individuals that did not use high-use areas because of the activities.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

There is no connection between the missing information and any reasonably foreseeable significant adverse effects identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-27

Actual Statement:

However, we reiterate that due to the limitations of available information and due to the limitations inherent in the study of baleen whales, there is uncertainty about the range of potential effects of a large spill on bowhead whales, especially if a large aggregation of females with calves were to be contacted by fresh oil.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

The missing information pertains to adverse effects that are already assumed to occur under certain circumstances. The analysis already assumes that if a large oil spill occurs, significant impacts to cetaceans could follow. Neither the probability or severity of such impacts would vary amongst any of the action alternatives. The decision-maker already has sufficient information regarding the relative probability and various impacts of a large oil spill to allow a reasoned choice among alternatives. Additional information on the myriad potential mechanisms of effect, specific behavioral responses or exact duration of impacts, while potentially useful, is not essential to a reasoned choice among alternatives.

Page Number: V-28

Actual Statement:

The possible influences of disease or predation and of overutilization are listed as 'Unknown.'

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Lack of information on the possible threat of disease or predation or overutilization of fin whales does not constitute missing information relevant to reasonably foreseeable significant adverse effects. There is no correlation between the proposed action and these issues.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-29

Actual Statement:

The threat of disease or predation is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Lack of information on the possible threat of disease or predation on humpback whales does not constitute missing information relevant to reasonably foreseeable significant adverse effects. There is no correlation between the proposed action and these issues.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-29

Actual Statement:

There are no records of humpbacks killed or injured in the fisheries in which fishers self report (Angliss and Lodge, 2002), but the reliability of such data is unknown.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The lack of records indicating that humpbacks were killed or injured by commercial fishing operations does not constitute missing information relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-30

Actual Statement:

The impacts of pollution and habitat degradation due to coastal development are not known.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS does not anticipate any adverse effects on humpback whales from pollution or habitat degradation associated with coastal development. The statement does not indicate any missing information relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-31

Actual Statement:

Very little information has been published on the effects of contaminants on the Pacific walrus, and MMS is aware of no analysis of cumulative effects that has been published to date.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Lack of published information on contamination impacts on the Pacific walrus does not constitute missing information relevant to reasonably foreseeable significant adverse effects. No such effects of this type to Pacific walrus were identified in the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-32

Actual Statement:

Because very little is known about the distributions, population sizes or habitat use of marine mammals in the Chukchi Sea, it is difficult to determine if significant impacts will or will not occur to marine mammals as a result of the proposed action.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

As this general statement indicates, there will be some level of incomplete information on marine mammal distribution, population size and habitat use in the Chukchi Sea. However, sufficient information is available to support sound scientific judgments and reasoned managerial decisions at the lease sale stage. Activities with the potential to affect marine mammals will be subject to additional BOEM as well as NMFS and/or FWS review processes. Appropriate mitigation measures can and will be applied as proposals for specific activities are submitted. This multi-stage process permit more detailed review of each proposal, and development of more tailored mitigation measures. As per the MMPA and ESA, significant impacts must be avoided. This separate, thorough review and minimized potential for significant impacts is common to all alternatives. In light of the above, any "incomplete information" regarding marine mammal distribution, population size and habitat use is not essential to a reasoned choice between alternatives at the lease sale stage.

Page Number: V-32

Actual Statement:

Unfortunately, there is no information to determine whether or not there are health effects for walrus at this cadmium level.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Lack of information demonstrating adverse health effects does not qualify as missing information relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-35

Actual Statement:

[T]he relationship between the expanding gray whale population to amphipod community dynamics is unknown but is of considerable interest.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

While this statement indicates that this information may be of some interest to certain scientists, it does not indicate any missing information relevant to reasonably foreseeable adverse effects on the human environment.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-36

Actual Statement:

However, with the collapse of the Soviet empire in 1991, levels of illegal harvest dramatically increased in Chukotka in the Russian Far East (Amstrup, 2000; USDOI, FWS, 2003). While the magnitude of the Russian harvest from the CBS is not precisely known, some estimates place it as high as 400 bears per year, although the figure is more likely between 100 and 250 bears per year.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The exact size of illegal harvest of polar bears in Russia is not related to any component of the Proposed Action or relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-36

Actual Statement:

Quantitative data are lacking that specifically addresses the potential cumulative impacts of development on polar bears and the effects of disturbance related to human activities on polar bear habitat use, as well as recruitment and survival (Perham, 2005). There also is a high degree of uncertainty regarding the spatial scope of potential Industry activities on the Alaskan OCS.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Sufficient data existed to determine that no significant adverse effects to polar bears would occur as a result of the Proposed Action, absent a large oil spill, an separate from the "disturbance" impacts discussed in this item. Additional quantitative data specifically addressing the cumulative impacts of development on polar bears is therefore not relevant to any reasonably foreseeable significant adverse effects. Uncertainty regarding the spatial scope of potential Industry activities on the Alaskan OCS is inherent to the lease sale stage; this statement does not identify any missing information that is relevant to reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-36

Actual Statement:

However, with the collapse of the Soviet empire in 1991, levels of illegal harvest dramatically increased in Chukotka in the Russian Far East (Amstrup, 2000; USDOI, FWS, 2003). While the magnitude of the Russian harvest from the CBS is not precisely known, some estimates place it as high as 400 bears per year, although the figure is more likely between 100 and 250 bears per year.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The exact size of the illegal polar bear harvest in Russia is not relevant to any reasonably foreseeable significant adverse effects of the Proposed Action or alternatives.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-36

Actual Statement:

A reliable estimate for the CBS stock of polar bears, which ranges into the southern Beaufort Sea, does not exist, and its current status is in question.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

There will be some level of incomplete information on population status of polar bears in the Chukchi and Bering Seas. All estimates are exactly that - estimates- because scientists do not/cannot count every single animal in these populations. However, sufficient information (i.e. information on general population range and trends) is available to support sound scientific judgments and reasoned managerial decisions. More accurate counts are not essential for a reasoned choice among alternatives. Furthermore, the missing information pertains to impacts that are common to all alternatives, a fact which further reduces the utility of this information to the decision maker.

Page Number: V-46

Actual Statement:

Limited monitoring data prevent effective assessment of cumulative subsistence-resource damage; resource displacement; changes in hunter access to resources; increased competition; contamination levels in subsistence resources; harvest reductions; or increased effort, risk, and cost to hunters. Limited data also limit our assessment of the effectiveness of mitigation measures.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The FEIS did not identify any significant adverse effects to subsistence activities from and of these activities or trends. The missing information is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-48

Actual Statement:

However, we reiterate that due to the limitations of available information and due to the limitations inherent in the study of baleen whales, there is uncertainty about the range of potential effects of a large spill on bowhead whales, especially if a large aggregation of females with calves were to be contacted by fresh oil. The NMFS has concluded that, given the abundance of plankton resources in the Beaufort Sea, it is unlikely that the availability of food resources for bowheads would be affected. Because of existing information available for other mammals regarding the toxic effects of fresh crude oil, and because of inconclusive results of studies on cetaceans after the EVOS, we are uncertain about the potential for mortality of more than a few individuals.

Is the Statement Relevant to Potentially Significant Effects? YES

If NO, explain

Is the Statement Essential to Making a Reasoned Choice? NO

If No, explain:

Page Number: V-49

Actual Statement:

However, data are inadequate to fully evaluate potential impacts on whales during this period, including the duration of habitat use effects or numbers and types of individuals that did not use high-use areas because of the activities.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

The missing data identified are associated with the ability to evaluate effects on bowhead whales from activities in the mid-1970s. Any such effect are connected to the proposed action and are not relevant to any reasonably foreseeable significant adverse effects identified by the FEIS.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-52

Actual Statement:

Quantitative data that specifically address potential cumulative impacts of development on polar bears and the effects of disturbance related to human activities on polar bear habitat, recruitment, and survival are lacking.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

Sufficient data existed to determine that no significant adverse effects to polar bears would occur as a result of the Proposed Action, absent a large oil spill, an separate from the "disturbance" impacts discussed in this item. Additional quantitative data specifically addressing the cumulative impacts of development on polar bears is therefore not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-59

Actual Statement:

These Arctic alterations would then be expected to affect global climate, although the models and mechanisms for predicting actual global consequences are still not clearly understood. Are observed temperature changes in the Arctic directly related to global warming? The answer is not clear, because data often are not known for extensive time periods and, when data are available, often they are not comparable.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

As the EIS (page V-16) explains, the proposed action has no appreciable influence on climate change. This information is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number: V-68

Actual Statement:

Stress to sociocultural systems that result from the encroachment of oil-production facilities into areas used for subsistence, although the cumulative effects of the relationship is difficult to precisely measure quantitatively because of lack of baseline data.

Is the Statement Relevant to Potentially Significant Effects? NO

If NO, explain

A thorough quantitative and qualitative analysis of potential direct, indirect, and cumulative impacts to sociocultural systems did not identify any reasonably foreseeable significant adverse effects. Therefore a lack of baseline data is not relevant to any reasonably foreseeable significant adverse effects.

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number:

Actual Statement:

Is the Statement Relevant to Potentially Significant Effects?

If NO, explain

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number:

Actual Statement:

Is the Statement Relevant to Potentially Significant Effects?

If NO, explain

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number:

Actual Statement:

Is the Statement Relevant to Potentially Significant Effects?

If NO, explain

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number:

Actual Statement:

Is the Statement Relevant to Potentially Significant Effects?

If NO, explain

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number:

Actual Statement:

Is the Statement Relevant to Potentially Significant Effects?

If NO, explain

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number:

Actual Statement:

Is the Statement Relevant to Potentially Significant Effects?

If NO, explain

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number:

Actual Statement:

Is the Statement Relevant to Potentially Significant Effects?

If NO, explain

Is the Statement Essential to Making a Reasoned Choice?

If No, explain:

Page Number:

Actual Statement:

Is the Statement Relevant to Potentially Significant Effects?

If NO, explain

Is the Statement Essential to Making a Reasoned Choice?

If No, explain: