PROPOSED ACTION:	Issuance of Incidental Harassment Authorizations to BP Exploration (Alaska) Inc. for the Take of Marine Mammals Incidental to Seismic and Geohazard Surveys in the Beaufort Sea, Alaska.
TYPE OF STATEMENT:	Environmental Assessment
LEAD AGENCY:	U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service
RESPONSIBLE OFFICIAL:	Donna S. Wieting, Director Office of Protected Resources, National Marine Fisheries Service
FOR FURTHER INFORMATION:	Candace Nachman National Marine Fisheries Service Office of Protected Resources Permits and Conservation Division 1315 East West Highway Silver Spring, MD 20910 301-427-8401
LOCATION:	Beaufort Sea, Alaska.
ABSTRACT:	This Environmental Assessment analyzes the environmental impacts of the National Marine Fisheries Service, Office of Protected Resources proposal to issue Incidental Harassment Authorizations, pursuant to section 101(a)(5)(D) of the Marine Mammal Protection Act, to BP Exploration (Alaska) Inc. for the take of small numbers of marine mammals incidental to conducting seismic and shallow geohazard surveys in the Beaufort Sea, Alaska.
DATE:	June 2014

TABLE OF CONTENTS

Chapter 1 Introduction and Purpose and Need 1
1.1. Description of Proposed Action 1
1.1.1. Background on BP's MMPA Applications 2
1.1.2. Marine Mammals in the Action Area 2
1.2. Purpose and Need 2
1.3. The Environmental Review Process 3
1.3.1. Laws, Regulations, or Other NEPA Analyses Influencing the EA's Scope 4
1.3.2. Scope of Environmental Analysis 5
1.3.3. NEPA Public Scoping Summary 6
1.3.4. Relevant Comments on Our *Federal Register* Notice 6
1.4. Other Permits, Licenses, or Consultation Requirements 6
1.4.1. Endangered Species Act 7
1.4.2. Marine Mammal Protection Act 7
1.4.3. Magnuson-Stevens Fishery Conservation and Management Act 7

Chapter 2 Alternatives 8
2.1. Introduction 8
2.2. Description of BP's Proposed Activities 8
2.2.1. Specified Time and Specified Area for 3D OBS Seismic Survey 8
2.2.2. 3D OBS Seismic Survey Operations 9
2.2.3. Specified Time and Specified Area for Shallow Geohazard Survey 10
2.2.4. Shallow Geohazard Survey Operations 11
2.3. Description of Alternatives 12
2.3.1. Alternative 1 – Issuance of Authorizations with Mitigation Measures 12
2.3.2. Alternative 2 – No Action Alternative 18
2.4. Alternatives Considered but Eliminated from Further Consideration 18

Chapter 3 Affected Environment 19
3.1. Physical Environment 19
3.1.1. Marine Mammal Habitat 19
3.2. Biological Environment 19
3.2.1. Marine Mammals 19
3.2.2. ESA-listed Marine Mammals 21
3.2.3. Non-ESA Listed Marine Mammals 22
3.3. Socioeconomic Environment 24
3.3.1. Subsistence 24

Chapter 4 Environmental Consequences 26
4.1. Effects of Alternative 1 – Issuance of an Authorization with Mitigation Measures 26
4.1.1. Impacts to Marine Mammal Habitat 26
4.1.2. Impacts to Marine Mammals 26
4.1.3. Impacts on Subsistence 31
4.2. Effects of Alternative 2 – No Action Alternative 32
4.2.1. Impacts to Marine Mammal Habitat 32
4.2.2. Impacts to Marine Mammals 33
4.2.3. Impacts to Subsistence 33
4.3. Compliance with Necessary Laws – Necessary Federal Permits 33
4.4. Unavoidable Adverse Impacts 33

4.5. Cumulative Effects 34
4.5.1. Past Commercial Whaling 34
4.5.2. Subsistence Hunting 34
4.5.3. Gas and Oil Development 36
4.5.4. Climate Change 37
4.5.5. Conclusion 38

Chapter 5 List of Preparers and Agencies Consulted 39

Chapter 6 Literature Cited 40

LIST OF ACRONYMS AND ABBREVIATIONS

3D	three dimensional
ADF&G	Alaska Department of Fish and Game
AKRO	Alaska Regional Office
ASAMM	Aerial Survey for Arctic Marine Mammals
Authorization	Incidental Harassment Authorization
BCB	Bering-Chukchi-Beaufort (stock of bowhead whales)
BOWFEST	Bowhead Whale Feeding Ecology Study
BP	BP Exploration (Alaska) Inc.
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dB re 1 µPa	decibel referenced to one microPascal
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
EZ	Exclusion Zone
ft	feet
FR	Federal Register
Hz	hertz
in^3	cubic inches
IPCC	Intergovernmental Panel on Climate Change
IWC	International Whaling Commission
kHz	kilohertz
km	kilometer
km^2	square kilometer
m	meter
mi	miles
mi^2	square miles
MMPA	Marine Mammal Protection Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OBS	Ocean Bottom Sensor
OMB	Office of Management and Budget
PRD	Protected Resources Division
PSO	Protected Species Observer
rms	root-mean-squared
USFWS	U.S. Fish and Wildlife Service

Chapter 1 Introduction and Purpose and Need

1.1. Description of Proposed Action

The Marine Mammal Protection Act (MMPA) prohibits the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: mortality, serious injury, or harassment, which includes injury and behavioral effects. The MMPA defines harassment as any act of pursuit, torment, or annoyance which: (1) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (2) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment). There are exceptions, however, to the MMPA's prohibition on take. The National Marine Fisheries Service (NMFS) may authorize the incidental taking of small numbers of marine mammals by harassment upon the request of a U.S. citizen provided we follow certain statutory and regulatory procedures and make determinations. This exception is discussed in more detail in Section 1.2.

We propose to issue two Incidental Harassment Authorizations (Authorizations) to BP Exploration (Alaska) Inc. (BP) under the MMPA for the incidental taking of small numbers of marine mammals, incidental to the conduct of two discrete actions: (1) a three dimensional (3D) ocean bottom sensor (OBS) seismic survey in the Prudhoe Bay area of the Beaufort Sea and (2) a shallow geohazard survey in the Foggy Island Bay area of the Beaufort Sea, Alaska. We do not have the authority to permit, authorize, or prohibit BP's survey activities under Section 101(a)(5)(D) of the MMPA, as that authority lies with a different Federal or State agency.

Our proposed action is a direct outcome of BP's request for authorization to take marine mammals because the activities have the potential to expose animals to noise originating from the seismic airgun arrays used for seismic data acquisition and scientific sonars/devices. BP therefore requires Authorizations for incidental take.

Our issuance of Authorizations to BP is a major federal action under the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations in 40 CFR §§ 1500-1508, and NOAA Administrative Order (NAO) 216-6. Thus, we are required to analyze the effects of our proposed action on the human environment.

This Environmental Assessment (EA), titled "*Issuance of Incidental Harassment Authorizations to BP Exploration (Alaska) Inc. for the Take of Marine Mammals Incidental to Seismic and Geohazard Surveys in the Beaufort Sea, Alaska*," (hereinafter, EA) addresses the potential environmental impacts of two alternatives, namely:

- Issue the two requested Authorizations to BP for Level B harassment of marine mammals during their 3D OBS seismic survey and shallow geohazard survey, taking into account the prescribed means of take, mitigation measures, and monitoring requirements; or
- Not issue either Authorization to BP in which case, for the purposes of NEPA analysis only, we assume that the activities would proceed and cause incidental take without the mitigation and monitoring measures that would otherwise be prescribed in a proposed Authorization.

1.1.1. Background on BP's MMPA Applications

BP proposes to conduct a 3D OBS seismic survey with a transition zone component on state and private lands and Federal and state waters in the Prudhoe Bay area of the Beaufort Sea between July 1 and September 30, 2014; however, airgun operations would conclude by August 25. The purpose of the proposed OBS seismic survey is to obtain current, high-resolution seismic data to image existing reservoirs, which will increase BP's understanding of the reservoir, allowing for more effective reservoir management. The following specific aspects of the proposed activity are likely to result in the take of marine mammals: airguns and pingers.

In a separate program, BP proposes to conduct a shallow geohazard survey in Federal and state waters of Foggy Island Bay in the Beaufort Sea between July 1 and September 30, 2014; however, airgun and other sound source equipment operations would conclude by August 25. The purpose of the proposed shallow geohazard survey is to evaluate development of the Liberty field. The following specific aspects of the proposed activity are likely to result in the take of marine mammals: airguns and scientific sonars/devices.

1.1.2. Marine Mammals in the Action Area

The proposed OBS seismic and shallow geohazard surveys could adversely affect the following marine mammal species under our jurisdiction:

- Beluga whale (*Delphinapterus leucas*)
- Bowhead whale (*Balaena mysticetus*)
- Gray whale (*Eschrichtius robustus*)
- Killer whale (*Orcinus orca*)
- Harbor porpoise (*Phocoena phocoena*)
- Ringed seal (*Phoca hispida*)
- Bearded seal (*Erignathus barbatus*)
- Spotted seal (*Phoca largha*)
- Ribbon seal (*Histriophoca fasciata*)

1.2. Purpose and Need

The MMPA prohibits "takes" of marine mammals, with a number of specific exceptions. The applicable exception in this case is an authorization for incidental take of marine mammals in section 101(a)(5)(D) of the MMPA.

Section 101(a)(5)(D) of the MMPA directs the Secretary of Commerce (Secretary) to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by United States citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if we make certain findings and provide a notice of a proposed authorization to the public for review. Entities seeking to obtain authorization for the incidental take of marine mammals under our jurisdiction must submit such a request (in the form of an application) to us.

We have issued regulations to implement the Incidental Take Authorization provisions of the MMPA (50 CFR Part 216) and have produced Office of Management and Budget (OMB)-approved application instructions (OMB Number 0648-0151) that prescribe the procedures necessary to apply for

authorizations. All applicants must comply with the regulations at 50 CFR § 216.104 and submit applications requesting incidental take according to the provisions of the MMPA.

Purpose: The primary purpose of our proposed action—the issuance of two Authorizations to BP—is to authorize the take of marine mammals incidental to BP's proposed activities. The Authorizations, if issued, would exempt BP from the take prohibitions contained in the MMPA.

To authorize the take of small numbers of marine mammals, we must evaluate the best available scientific information to determine whether the take would have a negligible impact on marine mammals or stocks and not have an unmitigable impact on the availability of affected marine mammal species for certain subsistence uses. We cannot issue an Authorization if it would result in more than a negligible impact on marine mammal species or stocks or if it would result in an unmitigable impact on subsistence.

In addition, we must prescribe, where applicable, the permissible methods of taking and other means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat (i.e., mitigation), paying particular attention to rookeries, mating grounds, and other areas of similar significance. If appropriate, we must prescribe means of effecting the least practicable impact on the availability of the species or stocks of marine mammals for subsistence uses. Authorizations must also include requirements or conditions pertaining to the monitoring and reporting of such taking in large part to better understand the effects of such taking on the species. Also, we must publish a notice of a proposed Authorization in the *Federal Register* for public notice and comment.

The purpose of this action is therefore to determine whether the take resulting from BP's OBS seismic survey and shallow geohazard survey activities would have a negligible impact on affected marine mammal species or stocks, would not have an unmitigable adverse impact on the availability of marine mammals for taking for subsistence uses, and develop mitigation and monitoring measures to reduce the potential impacts.

Need: BP submitted adequate and complete applications for the two separate projects on December 30, 2013, and on February 4, 2014, demonstrating both the need and potential eligibility for issuance of Authorizations in connection with the activities described in section 1.1.1. We now have a corresponding duty to determine whether and how we can authorize take by Level B harassment incidental to the activities described in BP's applications. Our responsibilities under section 101(a)(5)(D) of the MMPA and its implementing regulations establish and frame the need for this proposed action.

Any alternatives considered under NEPA must meet the agency's statutory and regulatory requirements. Our described purpose and need guide us in developing reasonable alternatives for consideration, including alternative means of mitigating potential adverse effects.

1.3. The Environmental Review Process

NEPA compliance is necessary for all "major" federal actions with the potential to significantly affect the quality of the human environment. Major federal actions include activities fully or partially funded, regulated, conducted, authorized, or approved by a federal agency. Because our issuance of an Authorization would allow for the taking of marine mammals consistent with provisions under the MMPA, we consider this as a major federal action subject to NEPA.

Under the requirements of NAO 216-6 section 6.03(f)(2)(b) for incidental harassment authorizations, we prepared this EA to determine whether the direct, indirect and cumulative impacts related to the issuance of two Authorizations for incidental take of marine mammals during the conduct of BP's OBS seismic and shallow geohazard surveys in the Beaufort Sea, Alaska, could be significant. If we deem the potential impacts to be not significant, this analysis, in combination with other analyses incorporated by reference, may support the issuance of a Finding of No Significant Impact for the proposed Authorizations.

1.3.1. Laws, Regulations, or Other NEPA Analyses Influencing the EA's Scope

We have based the scope of the proposed action and nature of the two alternatives considered in this EA on the relevant requirements in section 101(a)(5)(D) of the MMPA. Thus, our authority under the MMPA bounds the scope of our alternatives. We conclude that this analysis—when combined with the analyses in the following documents—fully describes the impacts associated with the proposed OBS seismic and shallow geohazard survey programs with mitigation and monitoring for marine mammals. After conducting an independent review of the information and analyses for sufficiency and adequacy, we incorporate by reference the relevant analyses on BP's proposed surveys as well as a discussion of the affected environment and environmental consequences within the following documents per 40 CFR 1502.21 and NAO 216-6 § 5.09(d):

- our notice of the proposed Authorization regarding the OBS seismic survey in the *Federal Register* (79 FR 21354, April 15, 2014);
- our notice of the proposed Authorization regarding the shallow geohazard survey in the *Federal Register* (79 FR 21522, April 16, 2014);
- *Incidental Harassment Authorization Request for the Non-Lethal Harassment of Marine Mammals during the Prudhoe Bay OBS Seismic Survey, Beaufort Sea, Alaska, 2014* (BP, 2013);
- *Incidental Harassment Authorization Request for the Non-Lethal Harassment of Marine Mammals during the Liberty Geohazard Survey, Beaufort Sea, Alaska, 2014* (BP, 2014); and
- *Environmental Assessment for the Issuance of an Incidental Harassment Authorization to Take Marine Mammals by Harassment Incidental to Conducting Open Water Seismic Surveys in the Simpson Lagoon Area of the Beaufort Sea* (NMFS, 2012).

MMPA APPLICATION AND NOTICE OF THE PROPOSED AUTHORIZATION

The CEQ regulations (40 CFR §1502.25) encourage federal agencies to integrate NEPA's environmental review process with other environmental reviews. We rely substantially on the public process for developing proposed Authorizations and evaluating relevant environmental information and provide a meaningful opportunity for public participation as we develop corresponding EAs. We fully consider public comments received in response to our publication of the notice of proposed Authorization during the corresponding NEPA process.

On April 15, 2014, and April 16, 2014, we published notices of proposed Authorizations in the *Federal Register* (79 FR 21354; 79 FR 21522), for the OBS seismic survey and the shallow geohazard survey, respectively, which included the following:

- a detailed description of the proposed action and an assessment of the potential impacts on marine mammals and their habitat and the availability of marine mammals for subsistence uses;

- plans for BP's mitigation and monitoring measures to avoid and minimize potential adverse impacts to marine mammals and their habitat and proposed reporting requirements; and
- our preliminary findings under the MMPA.

We considered BP's proposed operations and determined preliminarily that, provided the implementation of all required mitigation and monitoring measures, the impact on marine mammals of conducting the proposed 3D OBS seismic survey and the shallow geohazard survey in the Beaufort Sea, Alaska, from July through September 2014, would result, at worst, in a modification in behavior and/or low-level physiological effects (Level B harassment) of certain species of marine mammals. In addition, we determined that the activity would not have an unmitigable adverse impact on the availability of marine mammals for subsistence uses.

Within our notices, we requested that the public submit comments, information, and suggestions concerning BP's requests, the content of our proposed Authorizations, and potential environmental effects related to the proposed issuance of the Authorizations. This EA incorporates by reference and relies on BP's two applications (BP, 2013, 2014), our notices of proposed Authorizations, and our 2012 EA for a similar project in the Beaufort Sea (NMFS, 2012) to avoid duplication of analysis and unnecessary length.

1.3.2. Scope of Environmental Analysis

Given the limited scope of the decision for which we are responsible, this EA provides more focused information on the primary issues and impacts of environmental concern related specifically to our issuance of the Authorizations. This EA does not further evaluate effects to the elements of the human environment listed in Table 1 because previous environmental reviews have shown that BP's proposed surveys would not significantly affect those components of the human environment. Moreover, those analyses are consistent with our analyses regarding non-significant impacts to marine mammals and subsistence uses of marine mammals.

Table 1. Components of the human environment not affected by our issuance of an Authorization.

Biological	Physical	Socioeconomic / Cultural
Amphibians	Air Quality	Commercial Fishing
Humans	Essential Fish Habitat	Military Activities
Non-Indigenous Species	Geography	Oil and Gas Activities
Seabirds	Land Use	Recreational Fishing
	Oceanography	Shipping and Boating
	State Marine Protected Areas	National Historic Preservation Sites
	Federal Marine Protected Areas	National Trails and Nationwide Inventory of Rivers
	National Estuarine Research Reserves	Low Income Populations
	National Marine Sanctuaries	Minority Populations
	Park Land	Indigenous Cultural Resources
	Prime Farmlands	Public Health and Safety
	Wetlands	Historic and Cultural Resources
	Wild and Scenic Rivers	
	Ecologically Critical Areas	

1.3.3. NEPA Public Scoping Summary

NAO 216-6 established agency procedures for complying with NEPA and the implementing NEPA regulations issued by the CEQ. Consistent with the intent of NEPA and the clear direction in NAO 216-6 to involve the public in NEPA decision-making, we requested comments on the potential environmental impacts described in BP's MMPA applications and in the *Federal Register* notices of the proposed Authorizations. The CEQ regulations further encourage agencies to integrate the NEPA review process with review under the environmental statutes. Consistent with agency practice we integrated our NEPA review and preparation of this EA with the public process required by the MMPA for the proposed issuance of Authorizations.

The *Federal Register* notices of the proposed Authorizations, combined with our preliminary determinations, supporting analyses, and corresponding public comment period are instrumental in providing the public with information on relevant environmental issues and offering the public a meaningful opportunity to provide comments to us for consideration in both the MMPA and NEPA decision-making processes.

The *Federal Register* notices of the proposed Authorizations summarized our proposed action; stated that we would prepare an EA for the proposed action; and invited interested parties to submit written comments concerning the application and our preliminary analyses and findings including those relevant to consideration in the EA. The notice of the proposed Authorization for the OBS seismic survey was available for public review and comment from April 15, 2014, through May 15, 2014. The notice of the proposed Authorization for the shallow geohazard survey was available for public review and comment from April 16, 2014, through May 16, 2014.

1.3.4.Relevant Comments on Our *Federal Register* Notice

During the 30-day public comment period on the notice of the proposed Authorization for the OBS seismic survey, we received two comment letters from the following: the Marine Mammal Commission; and one private citizen. During the 30-day public comment period on the notice of proposed Authorization for the shallow geohazard survey, we received three comment letters from the following: the Marine Mammal Commission; and two private citizens.

We have considered all public comments, including those regarding monitoring and mitigation measures within the context of the MMPA requirement to effect the least practicable impact on marine mammals and their habitat and on subsistence uses of marine mammals. In summary, the comments focused on the take estimations and requiring monitoring to continue for 30 minutes after the cessation of airgun or other active sound source operations. We fully considered all of the public comments in preparing the final Authorizations and this EA. Where appropriate, changes to the proposed Authorizations that resulted from public comments have been incorporated into this EA. We added the requirement for 30 minute post-sound source use monitoring for both surveys.

1.4. Other Permits, Licenses, or Consultation Requirements

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action.

1.4.1.Endangered Species Act

Section 7 of the ESA and implementing regulations at 50 CFR §402 require consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service [USFWS]) for federal actions that "may affect" a listed species or critical habitat. NMFS' issuance of an Authorization is a federal action subject to these section 7 consultation requirements. Accordingly, NMFS is required to ensure that its action is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of critical habitat for such species.

There are two marine mammal species under NMFS' jurisdiction listed as threatened under the ESA and one marine mammal species under NMFS' jurisdiction listed as endangered under the ESA with confirmed or possible occurrence in the proposed project area (i.e., the Beaufort Sea): the ringed and bearded seals and the bowhead whale, respectively. There is currently no designated critical habitat in the Beaufort Sea for any of these species. The NMFS Office of Protected Resources Permits and Conservation Division consulted with the NMFS Alaska Regional Office (AKRO) Protected Resources Division (PRD) on the issuance of Authorizations under Section 101(a)(5)(D) of the MMPA because the action of issuing the Authorizations may affect threatened and endangered species under NMFS' jurisdiction. On June 10, 2014, NMFS AKRO PRD issued a Biological Opinion, which concluded that the issuance of an Authorization to BP for the 3D OBS seismic survey is not likely to jeopardize the continued existence of the endangered bowhead whale, threatened Arctic subspecies of ringed seal, or the threatened Beringia distinct population segment (DPS) of bearded seal or result in the destruction or adverse modification of any designated critical habitat. On June 19, 2014, NMFS AKRO PRD issued a Biological Opinion, which concluded that the issuance of an Authorization to BP for the shallow geohazard survey was not likely to jeopardize the continued existence of the endangered bowhead whale, threatened Arctic subspecies of ringed seal, or the threatened Beringia DPS of bearded seal or result in the destruction or adverse modification of any designated critical habitat. The information and analyses presented in both Biological Opinions are incorporated by reference.

1.4.2.Marine Mammal Protection Act

The MMPA and its provisions that pertain to the proposed action are discussed above in section 1.2.

1.4.3.Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Federal agencies are required to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency which may adversely affect essential fish habitat (EFH) identified under the MSFCMA. Presently, the five species of Pacific salmon occurring in Alaska are the only managed species with EFH designated in the Alaskan Beaufort Sea. NMFS' action of authorizing harassment of marine mammals in the form of an Authorization does not impact EFH; therefore, an EFH consultation was not conducted.

Chapter 2 Alternatives

2.1. Introduction

The NEPA and the implementing CEQ regulations (40 CFR §§ 1500-1508) require consideration of alternatives to proposed major federal actions and NAO 216-6 provides agency policy and guidance on the consideration of alternatives to our proposed action. An EA must consider all reasonable alternatives, including the No Action Alternative, even if that alternative does not meet the stated purpose and need. This provides a baseline analysis against which we can compare the other alternatives.

To warrant detailed evaluation as a reasonable alternative, an alternative must meet our purpose and need. In this case, as we previously explained in Chapter 1 of this EA, an alternative only meets the purpose and need if it satisfies the requirements under section 101(a)(5)(D) the MMPA. We evaluated each potential alternative against these criteria; identified one action alternative along with the No Action Alternative; and carried these forward for evaluation in this EA.

Alternative 1 includes a suite of mitigation measures intended to minimize potentially adverse interactions with marine mammals. This chapter describes the alternatives and compares them in terms of their environmental impacts and their achievement of objectives.

2.2. Description of BP's Proposed Activities

We presented a general overview of BP's proposed 3D OBS seismic survey operations and shallow geohazard survey operations in our *Federal Register* notices of proposed Authorizations (79 FR 21354, April 15, 2014; 79 FR 21522, April 16, 2014). We incorporate those descriptions by reference in this EA and briefly summarize them here.

2.2.1. Specified Time and Specified Area for 3D OBS Seismic Survey

The proposed start date of receiver deployment is approximately July 1, 2014, with seismic data acquisition beginning when open water conditions allow. This has typically been around July 15. Seismic survey data acquisition may take approximately 45 days to complete, which includes downtime for weather and other circumstances. Seismic data acquisition will occur on a 24-hour per day schedule with staggered crew changes. Receiver retrieval and demobilization of equipment and support crew will be completed by the end of September. Airgun operations will cease by midnight on August 25. Receiver and equipment retrieval and crew demobilization would continue after airgun operations end but would be completed by September 30.

The proposed seismic survey would occur in Federal and state waters in the Prudhoe Bay area of the Beaufort Sea, Alaska (see Figures 1 and 2). The seismic survey project area lies mainly within the Prudhoe Bay Unit and also includes portions of the Northstar, Dewline, and Duck Island Units, as well as non-unit areas. Figures 1 and 2 in BP's application outline the proposed seismic acquisition areas. The project area encompasses approximately 190 mi^2, comprised of approximately 129 mi^2 in water depths of 3 ft and greater, 28 mi^2 in waters less than 3 ft deep, and 33 mi^2 on land. The approximate boundaries of the project area are between 70°16' N. and 70°31' N. and between 147°52' W. and 148°47' W. and include state and federal waters, as well as state and private lands. Activity outside the 190 mi^2 area may include source vessels turning from one line to the other while using mitigation guns, vessel transits, and project support and logistics.

2.2.2. 3D OBS Seismic Survey Operations

BP's proposed OBS seismic survey would utilize sensors located on the ocean bottom or buried below ground nearshore (surf zone) and onshore. A total of two seismic source vessels would be used during the proposed survey, each carrying two airgun sub-arrays. The discharge volume of each airgun sub-array would not exceed 620 cubic inches (in^3). To limit the duration of the total survey, the source vessels would operate in a flip-flop mode (i.e., alternating shots); this means that one vessel discharges airguns when the other vessel is recharging. The activities associated with the proposed OBS seismic survey include equipment and personnel mobilization and demobilization, housing and logistics, temporary support facilities, and seismic data acquisition. The component of interest for this EA is the seismic data acquisition. Table 2 provides information on the airgun configuration and sound source signatures proposed for use during the 3D OBS seismic survey.

Table 2. Proposed airgun array configuration and sound source signatures as predicted by the Gundalf airgun array model for 2 m depth.

ARRAY SPECIFICS	620 IN^3 ARRAY	1240 IN^3 ARRAY
Number of guns	Eight 2000 psi sleeve airguns (2 x 110, 2 x 90, 2 x 70, and 2 x 40 in^3) in one array)	Sixteen 2000 psi sleeve airguns (4 x 110, 4 x 90, 4 x 70, and 4 x 40 in^3), equally divided over two sub-arrays of eight guns each
Zero to peak	6.96 bar-m (~237 dB re µPa @ 1 m)	13.8 bar-m (~249 dB re 1µPa @ 1 m)
Peak to peak	14.9 bar-m (~243 dB re µPa @ 1 m)	29.8 bar-m (~243 dB re 1µPa @ 1 m)
RMS pressure	0.82 bar-m (~218 dB re µPa @ 1 m)	1.65 bar-m (~224 dB re 1µPa @ 1 m)
Dominant frequencies	Typically less than 1 kHz	Typically less than 1 kHz

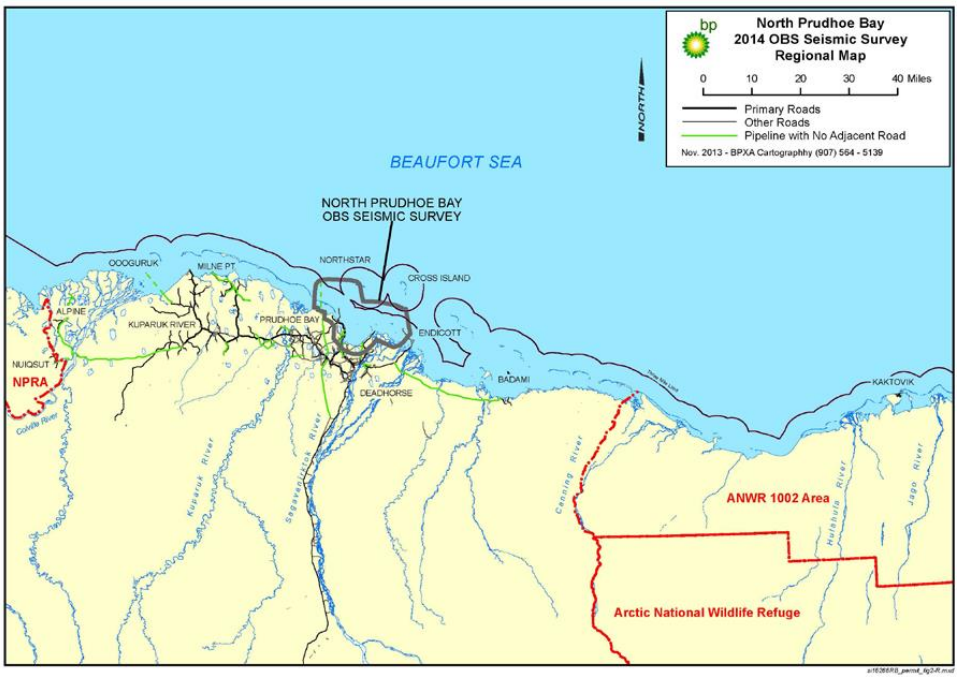

Figure 1. Overview of the eastern Beaufort Sea with the outline of the Prudhoe Bay seismic survey area.

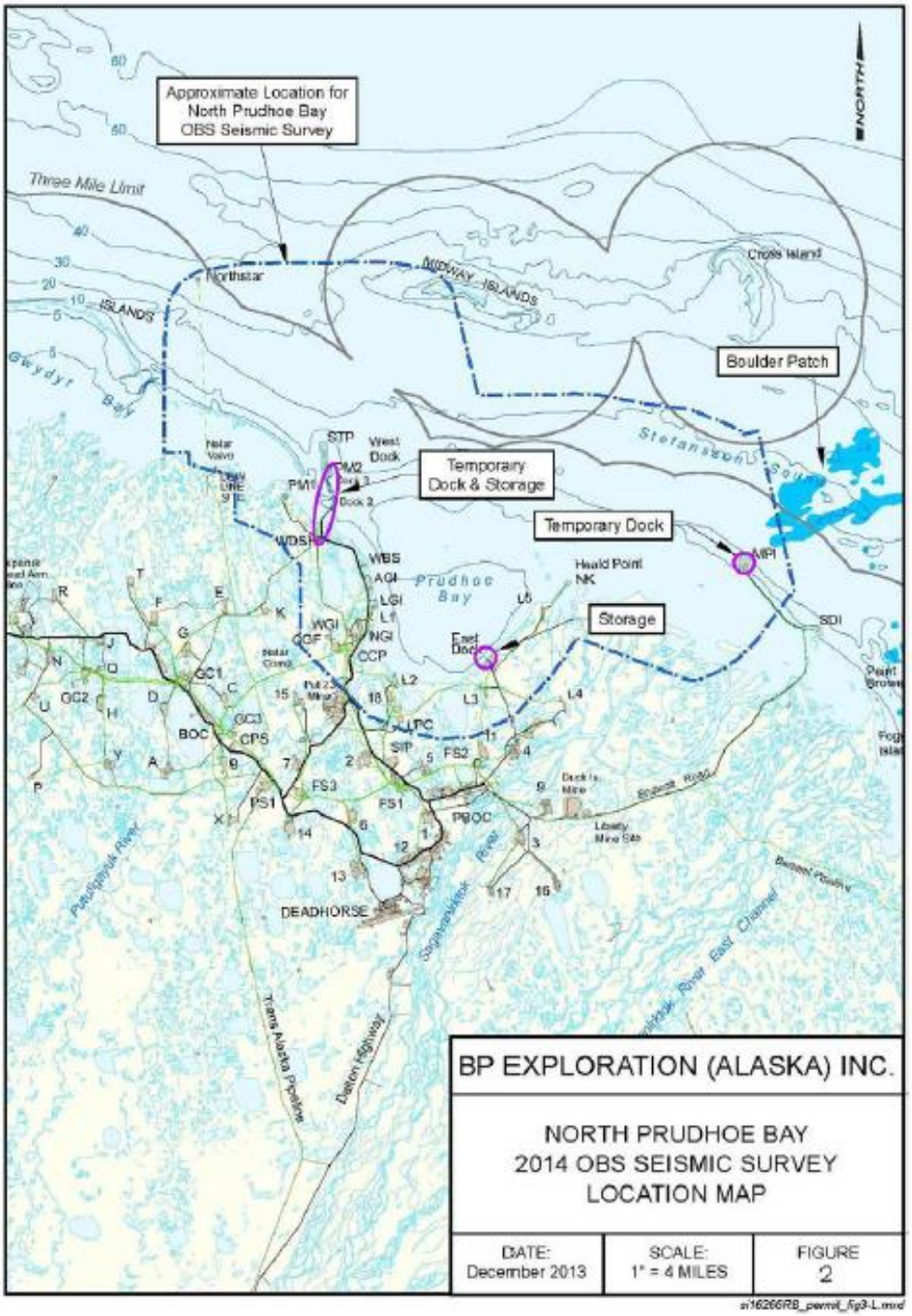

Figure 2. Approximate boundary of the proposed North Prudhoe Bay seismic survey area.

2.2.3. Specified Time and Specified Area for Shallow Geohazard Survey

The planned start date is approximately July 1, 2014, with data acquisition beginning when open water conditions allow. The survey is expected to take approximately 20 days to complete, not including weather downtime. Each phase of the survey (i.e., site survey and sonar survey) has an expected duration of 7.5 days based on a 24-hour workday. Between the first and second phase, the operations would focus

on changing equipment for about 5 days (i.e., no active sound sources would be used to acquire data during this time). Airgun and sonar operations will conclude by midnight on August 25. Demobilization of equipment would continue after airgun and sonar operations end but would be completed by September 30.

The proposed shallow geohazards survey would occur in Federal and state waters of Foggy Island Bay in the Beaufort Sea, Alaska. The project area lies mainly within the Liberty Unit but also includes portions of the Duck Island Unit, as well as non-unit areas. Figure 3 outlines the proposed survey acquisition areas, including proposed boundaries for the two phases of the project. The Phase 1 Site Survey, focused on obtaining shallow geohazard data using an airgun array and towed streamer, would occur within approximately 12 mi^2. The Phase 2 Sonar Survey would occur over the Site Survey area and over approximately 5 mi^2 within the 29 mi^2 area identified in Figure 3. Water depth in this area ranges from about 2-24 ft. Activity outside the area delineated in Figure 3 may include vessel turning while using airguns, vessel transit, and other vessel movements for project support and logistics. The approximate boundaries of the two survey areas are between 70°14’10’’ N. and 70°20’20’’ N. and between 147°29’05’’ W. and 148°52’30’’ W.

2.2.4. Shallow Geohazard Survey Operations

BP’s proposed shallow geohazard survey would consist of two phases: a site survey and a sonar survey. During the first phase, the Site Survey, the emphasis is on obtaining shallow geohazard data using an airgun array and a towed streamer. During the second phase, the Sonar Survey, data would be acquired both in the Site Survey location and subsea pipeline corridor area (see Figure 3) using the multibeam echosounder, sidescan sonar, subbottom profiler, and the magnetometer. The total discharge volume of the airgun array would not exceed 30 in^3. The activities associated with the proposed shallow geohazard survey include vessel mobilization, navigation and data management, housing and logistics, and data acquisition. The component of interest for this EA is the data acquisition. Tables 3 and 4 provide information on the airgun configuration and sound source signatures proposed for use during the shallow geohazard survey.

Table 3. Proposed 30 in^3 airgun array configurations and source signatures as predicted by the Gundalf Airgun Array Model for 1 m depth.

ARRAY SPECIFICS	30 IN^3 ARRAY OPTION 1	30 IN^3 ARRAY OPTION 2
Number of guns	Three 2000 psi sleeve airguns (3 x 10 in^3)	Two 2000 psi sleeve airguns (1 x 20 in^3, 1 x 10 in^3)
Zero to peak	4.89 bar-m (~234 dB re µPa @1 m)	3.62 bar-m (~231 dB re 1µPa @1 m)
Peak to peak	9.75 bar-m (~240 dB re µPa @1 m)	7.04 bar-m (~237 dB re 1µPa @1 m)
RMS pressure	0.28 bar-m (~209 dB re µPa @1 m)	0.22 bar-m (~207 dB re 1µPa @1 m)
Dominant frequencies	About 20-300 Hz	About 20-300 Hz

Table 4. Source characteristics of the proposed geophysical survey equipment of the Liberty geohazard survey.

EQUIPMENT	OPERATING FREQUENCY	ALONG TRACK BEAM WIDTH	ACROSS TRACK BEAM WIDTH	RMS SOUND PRESSURE LEVEL
Multibeam echosounder	200-400 kHz	1-2º	0.5-1º	~220 dB re 1 µPa @1m
Sidescan sonar	120-135 kHz 400-450 kHz	1.5º 0.4º	50º 50º	~215 dB re 1 µPa @1m
Subbottom profiler	2-16 kHz	15-24º	15-24º	~216 dB re 1 µPa @1m

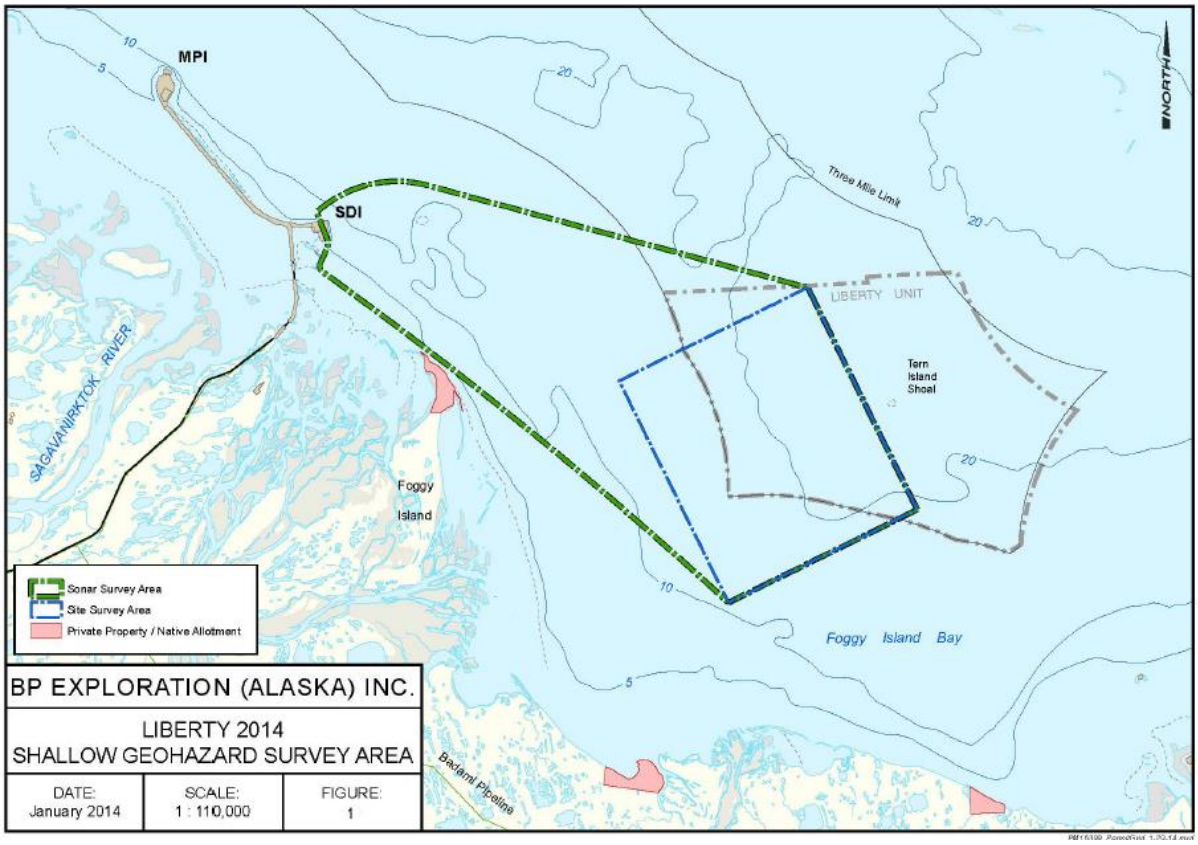

Figure 3. Proposed Liberty geohazard project area, showing the Site Survey Area (Phase 1 in blue) and Sonar Survey Area (Phase 2 in green).

2.3. Description of Alternatives

2.3.1. Alternative 1 – Issuance of Authorizations with Mitigation Measures

The Proposed Action constitutes Alternative 1 and is the Preferred Alternative. Under this alternative, we would issue two Authorizations (each valid from July 1 through September 30, 2014) to BP allowing the incidental take, by Level B harassment, of nine species of marine mammals subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the proposed Authorizations, along with any additions based on consideration of public comments.

As described in Section 1.2, we must prescribe the means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat. In order to do so, we must consider BP's proposed mitigation measures, as well as other potential measures, and assess how such measures could benefit the affected species or stocks and their habitat. Our evaluation of potential measures includes consideration of the following factors in relation to one another: (1) the manner in which, and the degree to which, we expect the successful implementation of the measure to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation.

Any additional mitigation measure proposed by us beyond what the applicant proposes should be able to or have a reasonable likelihood of accomplishing or contributing to the accomplishment of one or more of the following goals:

- Avoidance or minimization of marine mammal injury, serious injury, or death wherever possible;
- A reduction in the numbers of marine mammals taken (total number or number at biologically important time or location);
- A reduction in the number of times the activity takes individual marine mammals (total number or number at biologically important time or location);
- A reduction in the intensity of the anticipated takes (either total number or number at biologically important time or location);
- Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base; activities that block or limit passage to or from biologically important areas; permanent destruction of habitat; or temporary destruction/disturbance of habitat during a biologically important time; and
- For monitoring directly related to mitigation, an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

MITIGATION AND MONITORING MEASURES

To reduce the potential for disturbance from acoustic stimuli associated with the activities, BP proposed to implement several monitoring and mitigation measures for marine mammals. BP proposed both general mitigation measures that apply to all vessels involved in the surveys and specific mitigation measures that apply to airgun operations. NMFS proposed some additional measures. These measures, which would be the same for both surveys, include:

(1) Utilize NMFS-qualified, vessel-based PSOs to visually watch for and monitor marine mammals near the source vessels during daytime operations (from nautical twilight-dawn to nautical twilight-dusk; there will be no periods of total darkness until mid-August) and before and during start-ups of sound sources (i.e., airguns or sonars) day or night. Two PSOs would be on each source vessel to observe the exclusion zones. When practicable, as an additional means of visual observation, BP's vessel crew may also assist in detecting marine mammals.

(2) In the event that any aircraft (such as helicopters) are used offshore to support the proposed surveys, under no circumstances, other than an emergency, would aircraft be operated at an altitude lower than 305 m (1,000 ft) when within 0.5 km (0.3 mi) of a group of five or more whales. Aircraft would not hover or circle above or within 0.5 km (0.3 mi) of groups of five or more whales.

(3) When weather conditions require, such as when visibility drops, vessels shall reduce speeds to 9 knots to avoid the likelihood of marine mammal collisions.
(4) Vessel operators of small craft with propellers shall check the waters immediately adjacent to their vessels to ensure that no marine mammals will be injured when the vessel's propellers (or screws) are engaged.
(5) Vessel operators shall avoid concentrations/groups of five whales or more, and vessels shall not be operated in a way that separates members of a group. When feeding whales or groups of five or more whales are sighted, vessel speed shall be less than 10 knots.
(6) When within 300 m (900 ft) of whales, vessel operators shall reduce speed to 10 knots or less and steer around whales if circumstances allow but never cut off a whale's travel path and avoid multiple changes in direction and speed.
(7) Establish a 180 dB re 1 µPa (rms) and 190 dB re 1 µPa (rms) "exclusion zone" (EZ) for marine mammals before the full airgun array or a single airgun is in operation, respectively (see Tables 5 and 6 below for distances).
(8) Visually observe the entire extent of the EZ (180 dB re 1 µPa [rms] for cetaceans and 190 dB re 1 µPa [rms] for pinnipeds) using NMFS-qualified PSOs, for at least 30 minutes (min) prior to starting the airgun array (day or night). If the PSO finds a marine mammal within the EZ, BP must delay the survey until the marine mammal(s) has left the area. If the PSO sees a marine mammal that surfaces, then dives below the surface, the PSO shall wait 30 min. If the PSO sees no marine mammals during that time, they should assume that the animal has moved beyond the EZ. If for any reason the entire radius cannot be seen for the entire 30 min (i.e., rough seas, fog, darkness), or if marine mammals are near, approaching, or in the EZ, the airguns may not be ramped-up.
(9) Implement a "ramp-up" procedure when initiating the seismic operations or any time after the entire array has been shut down for more than 10 min, which means start the smallest sound source first and add sound sources in a sequence such that the source level of the array shall increase in steps. During ramp-up, the PSOs shall monitor the EZ, and if marine mammals are sighted, a power-down, or shutdown shall be implemented as though the full array were operational. Therefore, initiation of ramp-up procedures from shutdown requires that the PSOs be able to visually observe the full EZ as described above.
(10) Power-down or shutdown the sound source(s) if a marine mammal is detected within, approaches, or enters the applicable EZ. A shutdown means all operating sound sources are shut down (i.e., turned off). A power-down means reducing the number of operating sound sources to a single operating 10 in^3 airgun (or some other number less than the full airgun array), which reduces the EZ to the degree that the animal(s) is no longer in or about to enter it.
(11) Following a power-down, if the marine mammal approaches the smaller designated EZ, the sound sources must then be completely shut down. Survey activity shall not resume until the PSO has visually observed the marine mammal(s) exiting the EZ and is not likely to return, or has not been seen within the EZ for 15 min for pinnipeds or 30 min for cetaceans.
(12) Following a power-down or shutdown and subsequent animal departure, survey operations may resume following ramp-up procedures described above.
(13) Use of airguns and/or scientific sonars/devices may continue into night and low-light hours if such segment(s) of the survey is initiated when the entire applicable EZs can be

effectively monitored visually (i.e., PSO(s) must be able to see the extent of the entire applicable EZ).

(14) No initiation of survey operations involving the use of sound sources is permitted from a shutdown position at night or during low-light hours (such as in dense fog or heavy rain).

(15) Seismic survey operations involving the use of airguns and pingers must cease if takes of any marine mammal are met or exceeded.

(16) In cases when the "mitigation gun" would be used between active seismic data acquisition periods, the shot interval would be set to one shot per minute.

Table 5. Distances (in meters) to be used for mitigation purposes during BP's proposed 2014 North Prudhoe Bay 3D OBS seismic survey.

Airgun Discharge Volume (in^3)	190 dB re 1 µPa	180 dB re 1 µPa
620-1240 in^3	300	600
40 in^3	70	200
10 in^3	20	50

Table 6. Distances (in meters) to be used for mitigation purposes during BP's proposed 2014 Foggy Island Bay shallow geohazard survey.

Airgun Discharge Volume (in^3)	190 dB re 1 µPa	180 dB re 1 µPa
30 in^3	70	200
5 in^3	20	50

BP proposes to sponsor marine mammal monitoring during the present project, in order to implement the mitigation measures that require real-time monitoring and to satisfy the monitoring requirements of the Authorizations. The researchers would monitor the area for marine mammals during all activities. Monitoring would be conducted from vessels. Monitoring data would include the following:

(1) Environmental conditions – consisting of sea state (in Beaufort Wind force scale according to NOAA), visibility (in km, with 10 km indicating the horizon on a clear day), and sun glare (position and severity). These will be recorded at the start of each shift, whenever there is an obvious change in one or more of the environmental variables, and whenever the observer changes shifts;

(2) Project activity – consisting of airgun operations (on or off), number of active guns, line number. This will be recorded at the start of each shift, whenever there is an obvious change in project activity, and whenever the observer changes shifts; and

(3) Sighting information – consisting of the species (if determinable), group size, position and heading relative to the vessel, behavior, movement, and distance relative to the vessel (initial and closest approach). These will be recorded upon sighting a marine mammal or group of animals.

BP proposes to conduct research on fish species in relation to airgun operations, including prey species important to ice seals, during the proposed surveys. The 3D OBS seismic and shallow geohazard surveys offer a unique opportunity to assess the impacts of airgun sounds on fish, specifically on changes in fish abundance in fyke nets that have been sampled in the area for more than 30 years. The monitoring study would occur over a 2-month period during the open-water season. During this time, fish are counted and

sized every day, unless sampling is prevented by weather, the presence of bears, or other events. Fish mortality is also noted.

The fish-sampling period coincides with the proposed surveys, resulting in a situation where each of the four fyke nets will be exposed to varying daily exposures to airgun sounds. That is, as source vessels move back and forth across the project area, fish caught in nets will be exposed to different sounds levels at different nets each day. To document relationships between fish catch in each fyke net and received sound levels, BP will attempt to instrument each fyke net location with a recording hydrophone. Recording hydrophones, to the extent possible, will have a dynamic range that extends low enough to record near ambient sounds and high enough to capture sound levels during relatively close approaches by the airgun array (i.e., likely levels as high as about 200 dB re 1 µPa). Bandwidth will extend from about 10 Hz to at least 500 Hz. In addition, because some fish are likely to be sensitive to particle velocity instead of or in addition to sound pressure level, BP will attempt to instrument each fyke net location with a recording particle velocity meter. Acoustic and environmental data will be used in statistical models to assess relationships between acoustic and fish variables. Additional details of the fish monitoring study can be found in Section 13.1 of BP's applications (BP, 2013, 2014).

REPORTING MEASURES

After conclusion of each survey and the effectiveness of each Authorization, BP would submit a draft Technical Report on all activities and monitoring results to NMFS' Permits and Conservation Division within 90 days. Each Technical Report would include:

(1) Summary of project start and end dates, airgun activity, number of guns, and the number and circumstances of implementing ramp-up, power down, shutdown, and other mitigation actions;
(2) Summaries of monitoring effort (e.g., total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals);
(3) Analyses of the effects of various factors influencing detectability of marine mammals (e.g., sea state, number of observers, and fog/glare);
(4) Species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), and group sizes;
(5) Analyses of the effects of survey operations;
(6) Sighting rates of marine mammals during periods with and without seismic survey activities (and other variables that could affect detectability), such as: (i) initial sighting distances versus survey activity state; (ii) closest point of approach versus survey activity state; (iii) observed behaviors and types of movements versus survey activity state; (iv) numbers of sightings/individuals seen versus survey activity state; (v) distribution around the source vessels versus survey activity state; and (vi) estimates of exposures of marine mammals to Level B harassment thresholds based on presence in the 160 dB harassment zone.

NMFS would review the draft 90-day Technical Report. BP must then submit a final report to the Chief, Permits and Conservation Division, Office of Protected Resources, NMFS, within 30 days after receiving comments from NMFS on the draft report. If NMFS decides that the draft report needs no comments, the draft report shall be considered to be the final report. BP proposes to present the results of the fish and

airgun sound study to NMFS in a detailed report that will also be submitted to a peer reviewed journal for publication, presented at a scientific conference, and presented in Barrow and Nuiqsut.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by this Authorization, such as an injury (Level A harassment), serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), BP shall immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, and the Alaska Regional Stranding Coordinators. The report must include the following information:

(1) Time, date, and location (latitude/longitude) of the incident;
(2) The name and type of vessel involved;
(3) The vessel's speed during and leading up to the incident;
(4) Description of the incident;
(5) Status of all sound source use in the 24 hours preceding the incident;
(6) Water depth;
(7) Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
(8) Description of marine mammal observations in the 24 hours preceding the incident;
(9) Species identification or description of the animal(s) involved;
(10) The fate of the animal(s); and
(11) Photographs or video footage of the animal (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS shall work with BP to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. BP may not resume their activities until notified by NMFS via letter or email, or telephone.

In the event that BP discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition), BP would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, and the NMFS Alaska Stranding Hotline. The report must include the same information identified above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS would work with BP to determine whether modifications in the activities are appropriate.

In the event that BP discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the authorized activities (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), BP shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, the NMFS Alaska Stranding Hotline, and the Alaska Regional Stranding Coordinators within 24 hours of the discovery. BP shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. Activities may continue while NMFS reviews the circumstances of the incident.

Based on public comments received, we changed slightly the language of one monitoring requirement in the final Authorizations from the wording included in the proposed Authorizations. However, we have not received any information that would cause us to change our preliminary determinations under the MMPA. Accordingly, this Preferred Alternative would satisfy the purpose and need of our proposed action under the MMPA–issuance of two Authorizations, along with required mitigation measures and monitoring that meets the standards set forth in section 101(a)(5)(D) of the MMPA and the implementing regulations.

2.3.2. Alternative 2 – No Action Alternative

Under the No Action alternative, we would not issue two separate Authorizations to BP for the proposed 3D OBS seismic and shallow geohazard surveys. Under this alternative, BP could choose not to proceed with their proposed surveys or to proceed without Authorizations. If they choose the latter, BP would not be exempt from the MMPA take prohibitions and would be in violation of the MMPA if take of marine mammals occurs. For purposes of this EA, we characterize the No Action Alternative as BP not receiving Authorizations and BP conducting the 3D OBS seismic survey and the shallow geohazard survey without the protective measures and reporting requirements required by an Authorization under the MMPA. We take this approach to meaningfully evaluate the primary environmental issues—the impact on marine mammals from these activities in the absence of protective measures.

2.4. Alternatives Considered but Eliminated from Further Consideration

NMFS considered whether other alternatives could meet the purpose and need and support BP's proposed activities. An alternative that would allow for the issuance of Authorizations with no required mitigation or monitoring was considered but eliminated from consideration, as it would not be in compliance with the MMPA and therefore would not meet the purpose and need. For that reason, this alternative is not analyzed further in this document.

Chapter 3 Affected Environment

This chapter describes existing conditions in the proposed survey areas. Complete descriptions of the physical, biological, and social environment of the action area are contained in the documents listed in Section 1.3.1 of this EA. We incorporate those descriptions by reference and briefly summarize or supplement the relevant sections for marine mammals in the following subchapters.

3.1. Physical Environment

As discussed in Chapter 1, our proposed action and alternatives relate only to the proposed issuance of our Authorizations of incidental take of marine mammals and not to the physical environment. Certain aspects of the physical environment are not relevant to our proposed action (see subchapter 1.3.2 - Scope of Environmental Analysis). Because of the requirements of NAO 216-6, however, we briefly summarize the physical components of the environment here.

3.1.1. Marine Mammal Habitat

We presented information on marine mammal habitat and the potential impacts to marine mammal habitat in our notices of the proposed Authorizations. In summary, the Beaufort Sea is a main corridor of the bowhead whale migration route. The main migration periods occur in spring from April to June and in fall from late August/early September through October to early November. During the fall migration, several locations in the U.S. Beaufort Sea serve as feeding grounds for bowhead whales. Small numbers of bowhead whales that remain in the U.S. Arctic Ocean during summer also feed in these areas. The U.S. Beaufort Sea is not a main feeding or calving area for any other cetacean species. Beluga whales also migrate through the Beaufort Sea in the summer and fall; however, migrations of that species occur further offshore than the locations of the proposed surveys. Ringed seals breed and pup in the Beaufort Sea; however, this does not occur during the summer or early fall. Such life functions occur on ice, not during the open water season when the surveys are proposed to occur. None of the other ice seal species breed or pup in the U.S. Beaufort Sea. No critical habitat exists in the locations of the proposed surveys.

3.2. Biological Environment

3.2.1. Marine Mammals

We provide information on the occurrence of marine mammals most likely present in the proposed survey areas in section 1.1.2 of this EA. The marine mammals most likely to be present in the action area are: beluga, bowhead, gray, and killer whales; harbor porpoises; and ringed, bearded, spotted, and ribbon seals. Bowhead, beluga, and gray whales are the most commonly occurring cetaceans in the Beaufort Sea. Killer whales and harbor porpoises are sighted much more rarely in the Prudhoe Bay region of the Beaufort Sea. The ringed, bearded, and spotted seals are the most commonly occurring seal species in the Beaufort Sea, while ribbon seal occurrence are less common in the Prudhoe Bay area. Table 7 provides a summary of the abundance and status of the species likely to occur in the project area. We provided information on the distribution, population size, and conservation status for each species in the *Federal Register* notices on the proposed Authorizations, and we incorporate those descriptions by reference here. We briefly summarize this information here. BP's applications (BP, 2013, 2014) and our 2012 EA (NMFS 2012) on a similar action contain detailed information on life history functions, hearing abilities, and distribution, which is also incorporated by reference.

Table 7. Marine mammal species with confirmed or possible occurrence in the proposed survey areas.

Common Name	Scientific Name	Status	Occurrence	Seasonality	Range	Abundance
Odontocetes						
Beluga whale (Beaufort Sea stock)	Delphinapterus leucas	-	Common	Mostly spring and fall with some in summer	Russia to Canada	39,258
Killer whale	Orcinus orca	-	Occasional/ Extralimital	Mostly summer and early fall	California to Alaska	552
Harbor porpoise	Phocoena phocoena	-	Occasional/ Extralimital	Mostly summer and early fall	California to Alaska	48,215
Mysticetes						
Bowhead whale	Balaena mysticetus	Endangered; Depleted	Common	Mostly spring and fall with some in summer	Russia to Canada	16,892
Gray whale	Eschrichtius robustus	-	Somewhat common	Mostly summer	Mexico to the U.S. Arctic Ocean	19,126
Pinnipeds						
Bearded seal (Beringia distinct population segment)	Erigathus barbatus	Threatened; Depleted	Common	Spring and summer	Bering, Chukchi, and Beaufort Seas	155,000
Ringed seal (Arctic stock)	Phoca hispida	Threatened; Depleted	Common	Year round	Bering, Chukchi, and Beaufort Seas	300,000
Spotted seal	Phoca largha	-	Common	Summer	Japan to U.S. Arctic Ocean	141,479
Ribbon seal	Histriophoca fasciata	Species of concern	Occasional	Summer	Russia to U.S. Arctic Ocean	49,000

Endangered, threatened, or species of concern under the ESA; Depleted under the MMPA

3.2.2.ESA-listed Marine Mammals

3.2.2.1. Bowhead Whale

The Western Arctic or Bering-Chukchi-Beaufort (BCB) stock of bowhead whales inhabits Alaskan waters. They retain a close association with ice for most of the year. Most migrate annually from wintering areas in the northern Bering Sea, through the Chukchi Sea in the spring to summer in the Beaufort Sea before returning to the Bering Sea in the fall (Moore and Reeves, 1993; Quakenbush et al., 2010). The main migration corridor is located over the continental shelf, typically within 55 km (34 mi) of shore during years with light to moderate ice conditions (Treacy et al., 2006). Data demonstrate that bowhead whales tend to migrate west in deeper water (farther offshore) during years with higher-than-average ice coverage than in years with less ice.

Commercial whaling decreased the bowhead population to approximately 3,000 whales (Woodby and Botkin, 1993). Abundance estimates of whales from the BCB stock, before they were overharvested by commercial whaling, were between 10,400−23,000 whales. Since the ban on commercial whaling, the bowhead population has increased steadily. This is evidenced by data collected during 1977-2011 from ice-based counts, acoustic locations, and aerial transect data (Figure 9 in Givens et al., 2013). In 2011, the North Slope Borough successfully completed a new ice-based count of bowhead whales and estimated the population at ~16,892 animals with an annual growth rate of 3.7% (George et al., 2013; Givens et al., 2013).

Although most bowhead feeding activity occurs in the Canadian Beaufort Sea, feeding activity has also regularly been documented at Point Barrow, and less frequently, in other areas of the Alaskan Beaufort Sea (Richardson and Thomson, 2002; Koski et al., 2008; BOWFEST and ASAMM annual reports). Satellite tagging data showed that some whales were moving back and forth during the summer feeding season between the Alaskan and Candian Beaufort Sea (Quakenbush et al., 2010). While there is a chance that bowhead whales could be encountered during the proposed surveys, they are not commonly found in this region of the Beaufort Sea during the summer months and are typically found further offshore.

3.2.2.2. Ringed Seal

Ringed seals have a circumpolar distribution and are year round residents in the Beaufort, Bering, and Chukchi Seas (King, 1983). Frost and Lowry (1999) estimated 80,000 ringed seals in the Beaufort Sea during summer and 40,000 during winter, indicating that half of the population moves into the Chukchi and Bering seas in winter. They are typically the most abundant seal species seen in the Beaufort Sea. There is increasing concern about the future of the ringed seal due to receding ice conditions and potential habitat loss. NMFS listed the Arctic stock of ringed seals as threatened under the ESA, effective February 26, 2013.

Like the other ice seals, ringed seals are closely associated with sea ice during breeding, pupping, and molting. During the open-water season, ringed seals are widely dispersed as single animals or in small groups and they are known to move into coastal areas (Smith, 1987; Harwood and Stirling, 1992; Moulton and Lawson, 2002; Green et al., 2007). Satellite-tagging data revealed that ringed seals cover large distances between foraging areas and haulout sites during the open-water season (Lowry et al., 1998, 2000; Kelly et al., 2010; Herreman et al., 2012).

3.2.2.3. Bearded Seal

Bearded seals have a circumpolar distribution. In Alaska, they occur over the continental shelf waters of the Bering, Chukchi, and Beaufort Seas (Burns, 1981). Aerial surveys of the eastern Beaufort Sea conducted in June during 1974–1979, resulted in an average estimate of 2,100 individuals (Stirling et al., 1982), uncorrected for animals in the water. Since the survey area covered roughly half of the ice-covered continental shelf of the western Beaufort Sea, the estimated number of bearded seals in the Beaufort Sea is thought to be 1.5 times 2,100 or ~3,150 (Cameron et al., 2010). The Alaskan stock of bearded seals is considered to be greater than ~155,000 (77 FR 76739, December 28, 2012) and may be as large as 250,000–300,000 (Popov, 1976; Burns, 1981; MMS, 1996). NMFS listed the Alaska stock of bearded seals, part of the Beringia DPS, as threatened under the ESA effective February 26, 2013.

Bearded seals are closely associated with sea ice, specifically when they breed, give birth, raise young, molt, and rest. Bearded seals migrate seasonally with the advance and retreat of sea-ice (Kelly, 1988). As the ice recedes in the spring, bearded seals migrate from their winter grounds in the Bering Sea north through the Bering Strait (mid-April to June) to areas along the margin of the multi-year ice in the Chukchi Sea or to nearshore areas of the central and western Beaufort Sea. Pupping takes place on top of the ice from late-March through May, primarily in the Bering and Chukchi seas. Some pupping occurs on moving pack ice in the Beaufort Sea. Bearded seals have been commonly observed in the central Alaskan Beaufort Sea. Based on available data, bearded seals are expected to occur in the survey area, but the number of sightings is expected to be small.

3.2.3.Non-ESA Listed Marine Mammals

3.2.3.1. Beluga Whale

There are five stocks of beluga whales in Alaska: the Cook Inlet, Bristol Bay, eastern Bering Sea, eastern Chukchi Sea, and Beaufort Sea stocks (Allen and Angliss, 2013). Animals of the Beaufort Sea stock and eastern Chukchi Sea stock could potentially occur in the project area. The most recent population estimate for the Beaufort Sea stock is 39,258 individuals, and the eastern Chukchi Sea stock is estimated at 3,710 animals (Allen and Angliss, 2013). In spring, the Beaufort and Chukchi Sea stocks of beluga whales use open leads in the sea ice to migrate from their wintering grounds in the Bering Sea to the Arctic and to their respective summer grounds in the Beaufort and Chukchi Seas. Most animals of the Beaufort Sea stock migrate to the Mackenzie River estuary in the Canadian Beaufort Sea where they arrive in April or May, with some animals arriving as early as March or as late as July (Braham et al., 1977). They typically stay there during July and August to molt, feed, and calve. Belugas from the Chukchi Sea stock stay in coastal areas or shallow lagoons early in the summer, such as the Kasegaluk Lagoon in the Chukchi Sea. Later in the summer (after mid-July) they move offshore to forage in the ice-packed deeper waters along and beyond the continental shelf (Finley, 1982; Suydam et al., 2005). In the central and eastern Beaufort Sea, most beluga whales migrate in deep offshore waters along the ice edge more than 97 km (60 mi) north of the Alaskan coast, both during the spring and fall migration (Clarke et al., 2012, 2013). Relatively few beluga sightings have been recorded in the nearshore area of Prudhoe and Foggy Island Bays. Based on available information, there may be some chance encounters with beluga whales in the survey areas; however, the chances of such encounters during the summer period are low.

3.2.3.2. Gray Whale

There are currently two populations of gray whales in the North Pacific Ocean: the eastern North Pacific population, which lives along the west coast of North-America, and the western North Pacific population, which is believed to occur mainly along the coast of eastern Asia (Rice et al., 1984; Swartz et al., 2006) and summers near Sakhalin Island, Russia. Though populations have fluctuated greatly, the eastern Pacific gray whale population has recovered significantly from commercial whaling, and was delisted from the ESA in 1994. In 1997, Rugh et al. (2005) estimated the population at 29,758 ±3,122, and, in winter 2001-2002, the estimate was 18,178 ±1,780. The population estimate increased during winter 2006–2007 to 20,110 ±1,766 (Rugh et al., 2008). The eastern North Pacific population annually migrates from warm wintering ground lagoons in coastal Baja California and Mexico to summer foraging areas in the Bering and Chukchi Seas off northern Alaska and Russia (Jones and Swartz, 1984; Swartz et al., 2006; Lagerquist et al., 2011), primarily between Cape Lisburne and Point Barrow, most often in shallow coastal habitat (Moore et al., 2000). In addition, gray whale calls have been recorded throughout the winter in the Beaufort Sea near Barrow, Alaska, suggesting that some gray whales remain in Arctic waters during this season (Stafford et al., 2007).

Few gray whales have historically been recorded in the Beaufort Sea east of Point Barrow. Hunters at Cross Island took a single gray whale in 1933 (Maher, 1960). A small number of gray whale sightings have occurred in the last 100 years in the central Alaskan Beaufort Sea (ASAMM data; Williams and Coltrane, 2002; Aerts et al., 2008).

3.2.3.3. Spotted Seal

The spotted seal is found from the Beaufort Sea to the Sea of Japan. They are most numerous in the Bering and Chukchi Seas (Quakenbush, 1988), although small numbers do range into the Beaufort Sea during the summer (Rugh et al., 1997; Lowry et al., 1998). The most current abundance estimate for the eastern and central Bering Sea is 141,479 animals (95% CI 92,769–321,882) (Allen and Angliss, 2013). Pupping occurs in the Bering Sea wintering areas in early spring (March and April), followed by mating and molting in May and June (Quakenbush, 1988). The herds break up when the usable sea ice disappears in early summer, and spotted seals move toward ice-free coastal waters from Bristol Bay through western Alaska to the Chukchi and Beaufort Seas. Unlike other ice seals, spotted seals use coastal haulouts for at least part of the summer. Spotted seals are commonly seen in bays, lagoons, and estuaries, but also range offshore as far north as 69-72°N. Spotted seals have been observed frequently in the central Alaskan Beaufort Sea in recent years, although in low numbers. Haulout sites in the Beaufort Sea include Oarlock Island, Pisasuk River, the Colville River Delta, and Sagavanirktok River, of which the latter is near the proposed survey areas.

3.2.3.4. Uncommon or Extralimital Species

Killer whales, harbor porpoises, and ribbon seals could occur in the Beaufort Sea but are either uncommon or extralimital. Encounters with these species, if they occur at all, are expected to be in extremely low numbers. Killer whales are known to inhabit almost all coastal waters of Alaska, extending from southeast Alaska through the Aleutian Islands to the Bering and Chukchi Seas (Allen and Angliss, 2013). Killer whales have been seen infrequently in the Beaufort Sea (Leatherwood et al., 1986; Allen and Angliss, 2013). Harbor porpoise occur from Point Barrow along the western Alaskan coast, along the Aleutians and throughout southeast Alaska (Allen and Angliss, 2013) but are considered extralimital in

the Beaufort Sea. However, a small number of porpoises were seen in recent years (Hauser et al., 2008; Lyons et al., 2009). Ribbon seals are found in the North Pacific Ocean and parts of the Arctic Ocean, most often along the pack ice (Allen and Angliss, 2013). Ribbon seals have been sighted in very low numbers in the northeastern Chukchi Sea (Aerts et al., 2013; Haley et al., 2010).

3.3. Socioeconomic Environment

3.3.1. Subsistence

Subsistence remains the basis for Alaska Native culture and community. Marine mammals are legally hunted in Alaskan waters by coastal Alaska Natives. In rural Alaska, subsistence activities are often central to many aspects of human existence, including patterns of family life, artistic expression, and community religious and celebratory activities. Additionally, the animals taken for subsistence provide a significant portion of the food that will last the community throughout the year. The main species that are hunted include bowhead and beluga whales, ringed, spotted, and bearded seals, walruses, and polar bears. (Both the walrus and the polar bear are under the USFWS' jurisdiction.) The importance of each of these species varies among the communities and is largely based on availability.

Residents of the village of Nuiqsut are the primary subsistence users in the proposed survey areas. The communities of Barrow and Kaktovik also harvest resources that pass through the area of interest but do not hunt in or near the proposed survey areas. Subsistence hunters from all three communities conduct an annual hunt for autumn-migrating bowhead whales (late August/early September to October). Barrow also conducts a bowhead hunt in spring (April/May). Residents of all three communities hunt seals. Other subsistence activities include fishing, waterfowl and seaduck harvests, and hunting for walrus, beluga whales, polar bears, caribou, and moose. Beluga whales are not a prevailing subsistence resource for the communities of Kaktovik and Nuiqsut.

Nuiqsut is the community closest to the proposed survey areas (approximately 87 km [54 mi] southwest of the 3D OBS survey area and approximately 117.5 km [73 mi] southwest of the shallow geohazard survey area). Nuiqsut hunters harvest bowhead whales only during the fall whaling season, which typically occurs in early September (Long, 1996). In recent years, Nuiqsut whalers have typically landed three or four whales annually. Nuiqsut whalers concentrate their efforts on areas north and east of Cross Island, generally in water depths greater than 20 m (66 ft; Galginaitis, 2007). Cross Island is the principal base for Nuiqsut whalers while they are hunting bowheads (Long, 1996). Cross Island is located approximately 56.5 km (35 mi) east of the OBS seismic survey area and approximately 16 km (10 mi) from the closest boundary point for the shallow geohazard survey area.

Kaktovik whalers search for whales east, north, and occasionally west of Kaktovik. Kaktovik is located approximately 193 km (120 mi) east of Prudhoe Bay and approximately 146.5 km (91 mi) east of Foggy Island Bay in late August/September. The western most reported harvest location was about 13 mi (21 km) west of Kaktovik, near 70º10' N., 144º11' W. (Kaleak, 1996). That site is more than 129 km (80 mi) east of the nearer of the two proposed survey areas.

Barrow whalers search for whales much farther from the two proposed survey areas in September and October—about 250+ km (155+ mi) to the west of the nearer of the two proposed survey areas. Barrow hunters have expressed concerns about "downstream" effects to bowhead whales during the westward fall migration; however, BP will cease airgun operations prior to the start of the fall migration and hunt.

Ringed seals are available to subsistence users in the Beaufort Sea year-round, but they are primarily hunted in the winter or spring due to the rich availability of other mammals in the summer. Bearded seals are primarily hunted during July in the Beaufort Sea; however, in 2007, bearded seals were harvested in the months of August and September at the mouth of the Colville River Delta, which is approximately 80+ km (50+ mi) from the proposed survey areas. However, this sealing area can reach as far east as Pingok Island, which is approximately 32 km (20 mi) west of the survey areas. An annual bearded seal harvest occurs in the vicinity of Thetis Island (which is a considerable distance from Prudhoe and Foggy Island Bays) in July through August. Approximately 20 bearded seals are harvested annually through this hunt. Spotted seals are harvested by some of the villages in the summer months. Nuiqsut hunters typically hunt spotted seals in the nearshore waters off the Colville River Delta. The majority of the more established seal hunts that occur in the Beaufort Sea, such as the Colville delta area hunts, are located a significant distance (in some instances 80 km [50 mi] or more) from the proposed survey areas.

Chapter 4 Environmental Consequences

This chapter of the EA includes a discussion of the impacts of the two alternatives on the human environment. BP's applications, our notices of proposed Authorizations, and other related environmental analyses identified previously, inform our analysis of the direct, indirect, and cumulative effects of our proposed issuance of two separate Authorizations to BP.

Under the MMPA, we have evaluated the potential impacts of BP's OBS seismic survey and shallow geohazard survey activities in order to determine whether to authorize incidental take of marine mammals. Under NEPA, we have determined that an EA is appropriate to evaluate the potential significance of environmental impacts resulting from the issuance of our Authorizations.

4.1. Effects of Alternative 1 – Issuance of an Authorization with Mitigation Measures

Alternative 1 is the Preferred Alternative where we would issue two Authorizations to BP each allowing the incidental take, by Level B harassment, of nine species of marine mammals from July through September 2014, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the Authorizations, if issued.

4.1.1. Impacts to Marine Mammal Habitat

Our proposed action (i.e., the issuance of two separate Authorizations for the take of marine mammals) would have no additive or incremental effect on the physical environment beyond those resulting from BP's proposed survey activities. BP's proposed survey areas are not located within a marine sanctuary or a National Park. No critical habitat exists in the proposed survey areas. The proposed surveys would minimally add to vessel traffic in the region. The proposed activities would not result in substantial damage to ocean and coastal habitats that might constitute marine mammal habitat. Placement and retrieval of the nodes for the 3D OBS seismic survey may cause temporary and localized increases in turbidity on the seafloor; however, the turbidity created by placing and removing nodes on the seafloor would settle to background levels within minutes after the cessation of activity. We do not anticipate that the 3D seismic survey or shallow geohazard survey operations would physically alter the marine environment or negatively impact the physical environment in the proposed survey areas. Finally, the Authorizations would not impact physical habitat features, such as substrates and/or water quality, as the Authorizations only allow for the take of marine mammals by Level B harassment and include mitigation measures to reduce impacts to marine mammals and their habitat.

4.1.2.Impacts to Marine Mammals

We expect that the 3D OBS seismic and shallow geohazard survey programs would have the potential to impact marine mammals. Acoustic stimuli generated by the airgun arrays (and to a lesser extent the pingers, sidescan sonar, and sub-bottom profiler) may affect marine mammals in one or more of the following ways: tolerance, masking of natural sounds, behavioral disturbance, and temporary or permanent hearing impairment, or non-auditory physical effects (Richardson et al. 1995a). Our notices of proposed Authorizations, BP's applications (BP, 2013, 2014), and our 2012 EA on a similar action (NMFS 2012) provide detailed descriptions of these potential effects of seismic and shallow geohazard surveys on marine mammals. That information is incorporated herein by reference and summarized next.

Numerous studies have shown that underwater sounds from industry activities are often readily detectable by marine mammals in the water at distances of many kilometers. Numerous studies have also shown that

marine mammals at distances more than a few kilometers away often show no apparent response to industry activities of various types (Miller et al., 2005; Bain and Williams, 2006). This is often true even in cases when the sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to underwater sound such as airgun pulses or vessels under some conditions, at other times mammals of all three types have shown no overt reactions (e.g., Malme et al., 1986; Richardson et al., 1995a,b; Madsen and Mohl, 2000; Croll et al., 2001; Jacobs and Terhune, 2002; Madsen et al., 2002; Miller et al., 2005).

Masking is the obscuring of sounds of interest by other sounds, often at similar frequencies. Marine mammals are highly dependent on sound, and their ability to recognize sound signals amid other noise is important in communication, predator and prey detection, and, in the case of toothed whales, echolocation. Although some degree of masking is inevitable when high levels of manmade broadband sounds are introduced into the sea, marine mammals have evolved systems and behavior that function to reduce the impacts of masking. Structured signals, such as the echolocation click sequences of small toothed whales, may be readily detected even in the presence of strong background noise because their frequency content and temporal features usually differ strongly from those of the background noise (Au and Moore, 1988, 1990). The components of background noise that are similar in frequency to the sound signal in question primarily determine the degree of masking of that signal.

Masking effects of underwater sounds from BP's proposed survey activities on marine mammal calls and other natural sounds are expected to be limited. For example, harbor porpoises and beluga and killer whales primarily use high-frequency sounds to communicate and locate prey; therefore, masking by low-frequency sounds associated with survey activities is not expected to occur (Gales, 1982). There is evidence of other marine mammal species continuing to call in the presence of industrial activity. Annual acoustical monitoring near BP's Northstar production facility during the fall bowhead migration westward through the Beaufort Sea has recorded thousands of calls each year (for example, see Aerts and Richardson, 2008). Construction, maintenance, and operational activities have been occurring from this facility for over 10 years. To compensate and reduce masking, some mysticetes may alter the frequencies of their communication sounds (Richardson et al., 1995a; Parks et al., 2007).

There is little concern regarding masking in this case due to the brief duration of these pulses and relatively longer silence between airgun shots (5-6 seconds for the OBS seismic survey and 3-4 seconds for the shallow geohazard survey) near the sound source. Therefore, masking effects are anticipated to be limited, especially in the case of odontocetes, given that they typically communicate at frequencies higher than those of the airguns. Moreover, the time period when the airguns will be used is a time when most cetaceans are not in the general vicinity.

Marine mammals may behaviorally react to sound when exposed to anthropogenic noise. These behavioral reactions are often shown as: changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where noise sources are located; and/or flight responses (e.g., pinnipeds flushing into water from haul-outs or rookeries). The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of

noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Richardson et al. 1995a; Southall et al. 2007).

Baleen whales generally tend to avoid operating airguns, but avoidance radii are quite variable. Whales are often reported to show no overt reactions to pulses from large arrays of airguns at distances beyond a few kilometers, even though the airgun pulses remain well above ambient noise levels out to much greater distances (Miller et al., 2005). However, baleen whales exposed to strong noise pulses often react by deviating from their normal migration route (Richardson et al., 1999). Migrating gray and bowhead whales were observed avoiding the sound source by displacing their migration route to varying degrees but within the natural boundaries of the migration corridors (Schick and Urban, 2000; Richardson et al., 1999; Malme et al., 1983). Baleen whale responses to pulsed sound however may depend on the type of activity in which the whales are engaged. Some evidence suggests that feeding bowhead whales may be more tolerant of underwater sound than migrating bowheads (Miller et al., 2005; Lyons et al., 2009; Christie et al., 2010).

Little systematic information is available about reactions of beluga whales, killer whales, and harbor porpoise to noise pulses. In general, small toothed whales more often tend to head away, or to maintain a somewhat greater distance from the vessel, when a large airgun array is operating (e.g., Stone and Tasker 2006; Weir 2008). Beluga whales exhibit changes in behavior when exposed to strong, pulsed sounds similar in duration to those typically used in seismic surveys (Finneran et al. 2000, 2002). However, the animals tolerated high received levels of sound (peak–peak level >200 dB re 1 μPa) before exhibiting aversive behaviors (Richardson et al. 1995b).

Pinnipeds are not likely to show a strong avoidance reaction to the airgun sources proposed for use. Visual monitoring from seismic vessels has shown only slight (if any) avoidance of airguns by pinnipeds and only slight (if any) changes in behavior. Monitoring work in the Alaskan Beaufort Sea during 1996–2001 provided considerable information regarding the behavior of Arctic ice seals exposed to seismic pulses (Harris et al., 2001; Moulton and Lawson, 2002). These seismic projects usually involved arrays of 6 to 16 airguns with total volumes of 560 to 1,500 in^3. The combined results suggest that some seals avoid the immediate area around seismic vessels. In most survey years, ringed seal sightings tended to be farther away from the seismic vessel when the airguns were operating than when they were not (Moulton and Lawson, 2002). However, these avoidance movements were relatively small, on the order of 100 m (328 ft) to a few hundreds of meters, and many seals remained within 100–200 m (328–656 ft) of the trackline as the operating airgun array passed by. Marine mammal reactions are expected to be very localized and confined to relatively small distances and durations, with no long-term effects on individuals or populations.

NMFS currently estimates that Level B (behavioral) harassment of marine mammals from impulsive sound sources, such as the airguns, could occur if animals are exposed to sound pressure levels of 160 dB re 1 μPa (rms) or greater. For the 3D OBS seismic survey in Prudhoe Bay, the Level B harassment radius from the full airgun array is estimated to be 2,200 m (7,218 ft). For the shallow geohazard survey in Foggy Island Bay, the Level B harassment radius from the full airgun array is estimated to be 1,000 m (3,281 ft). Because these distances are fairly small compared to the large area of the Beaufort Sea used by these marine mammal species, the fact that most cetacean species do not occur in water as shallow as that of the proposed survey locations, and many cetaceans are not found in this part of the Beaufort Sea in

July and August, very few marine mammals are expected to be exposed to levels thought to cause behavioral harassment.

Additional sonar devices are proposed to be used during the shallow geohazard survey. The multibeam echosounder proposed for use during BP's geohazard survey does not produce frequencies within the hearing range of marine mammals. Exposure to sounds generated by this instrument, therefore, does not present a risk of potential physiological damage, hearing impairment, and/or behavioral responses.

The sidescan sonar does not produce frequencies within the hearing range of mysticetes and ice seals, but when operating at 110-135 kHz could be audible by mid- and high-frequency cetaceans, depending on the strength of the signal. However, when it operates at the much higher frequencies greater than 400 kHz, it is outside of the hearing range of all marine mammals. The signal from side scan sonars is narrow, typically in the form of a conical beam projected directly below the vessel. Based on previous measurements of a sidescan sonar working at similar frequencies in deeper water, distances to sound levels of 190, 180, and 160 dB re 1μPa (rms) were 22 and 47 m (72 and 154 ft), respectively (Warner and McCrodan, 2011). It is unlikely that an animal would be exposed for an extended time to a signal strong enough for hearing impairment to occur, unless the animal is present within the beam under the vessel and swimming with the same speed and direction. The distance at which beluga whales could react behaviorally to the sidescan sonar signal is about 200 m (656 ft; Warner and McCrodan, 2011). However, the response, if it occurs at all, is expected to be short term. Masking is unlikely to occur due to the nature of the signal and because beluga whales and ice seals generally vocalize at frequencies lower than 100 kHz.

Sub-bottom profilers will be audible to all three hearing classes of marine mammals that occur in the proposed survey area. Based on previous measurements of various sub-bottom profilers, the rms sound pressure level does not reach 180 dB re 1μPa (Funk et al., 2008; Ireland et al., 2009; Warner and McCrodan, 2011). Distances to sound levels that could result in mild behavioral responses, such as avoidance, ranged from 1 to 30 m (3.3 to 98 ft). Masking is unlikely due to the low duty cycle, directionality, and brief period when an individual mammal is likely to be within the beam. Additionally, the higher frequencies of the instrument are unlikely to overlap with the lower frequency calls by mysticetes.

Some stranding events of mid-frequency cetaceans were attributed to the presence of sonar surveys in the area (e.g., Southall et al., 2006). Recently, an independent scientific review panel concluded that the mass stranding of approximately 100 melon-headed whales in northwest Madagascar in 2008 was primarily triggered by a multibeam echosounder system (Southall et al., 2013), acknowledging that it was difficult to find evidence showing a direct cause-effect relationships. The multibeam echosounder proposed in this survey will operate at much higher frequencies, outside the hearing range of any marine mammal. The sidescan sonar and sub-bottom profiler are much less powerful. Considering the acoustic specifics of these instruments, the shallow water environment, the unlikely presence of toothed whales in the area, and planned mitigation measures, no marine mammal stranding or mortality are expected.

Based on this information, we expect that these takes would result, at worst, in a temporary modification in behavior, temporary changes in animal distribution, and/or low-level physiological effects (Level B harassment) of certain species or stocks of marine mammals. At most, we interpret these effects on marine mammals as falling within the MMPA definition of Level B (behavioral) harassment. We expect

these impacts to be minor because we do not anticipate measurable changes to the population or impacts to rookeries, mating grounds, and other areas of similar significance.

Under the Preferred Alternative, we would authorize incidental take, by Level B harassment only, of nine species of marine mammals in two separate Authorizations, with required mitigation, monitoring, and reporting measures. We expect no long-term or substantial adverse effects on marine mammals, their habitats, or their role in the environment. We base our conclusion on the results of previous monitoring reports for similar surveys conducted in the Alaskan Beaufort and Chukchi Seas in recent years (e.g., Aerts et al., 2008; Hauser et al., 2008; Brueggeman, 2009; Reiser et al., 2010, 2011; HDR, Inc., 2013).

BP proposed a number of monitoring and mitigation measures for marine mammals, and we included some additional mitigation measures not proposed by BP, as part of our evaluation for the Preferred Alternative. In consideration of the potential effects of the proposed seismic and shallow geohazard surveys, we determined that the mitigation and monitoring measures described in Section 2.3.1 of this EA (see pages 13-15) would be appropriate for the preferred alternative to meet the Purpose and Need.

Injury: BP did not request authorization to take marine mammals by injury (Level A harassment), serious injury, or mortality. Based on the results of our analyses, BP's environmental analyses, and previous monitoring reports for similar activities, there is no evidence that BP's planned activities could result in injury, serious injury, or mortality within the action area. The required mitigation and monitoring measures would minimize any potential risk for marine mammals. As noted in Tables 5 and 6 earlier in this EA, the distances for monitoring and mitigating effects within the Level A (injury) harassment zones are quite small.

Vessel Strikes: The potential for striking marine mammals is a concern with vessel traffic. Studies have associated ship speed with the probability of a ship strike resulting in an injury or mortality of an animal. However, it is highly unlikely that BP would strike a marine mammal. Typical vessel speeds of the source vessels while collecting seismic/sonar data is between 1-5 knots. Moreover, mitigation measures would be required of BP to reduce speed or alter course if collisions with marine mammals appear likely.

Estimated Take of Marine Mammals by Level B Incidental Harassment: BP has requested take by Level B harassment as a result of the acoustic stimuli generated by their proposed OBS seismic and shallow geohazard surveys. We expect that the surveys would cause a short-term behavioral disturbance for marine mammals in the proposed areas.

As mentioned previously, we estimate that the activities could potentially affect, by Level B harassment only, nine species of marine mammals under our jurisdiction. For each species, these estimates are small numbers (less than one percent for each species) relative to the population sizes. Tables 8 and 9 outline the numbers of Level B harassment takes that we propose to authorize in each Authorization, the regional population estimates for marine mammals in the action area, and the percentage of each population or stock that may be taken as a result of each of BP's activities.

Our proposed Authorization notices and BP's applications (BP, 2013, 2014) contain complete descriptions of how these take estimates were derived. In summary, BP used data from the 2012 and 2013 Aerial Survey for Arctic Marine Mammals (ASAMM) surveys to estimate densities for bowhead and beluga whales. Those densities were then multiplied by the anticipated area around each source vessel

that is ensonified by the 160 dB re 1 µPa (rms) sound pressure level and the estimated number of 24-hour days that the source vessels are operating. For ice seals, BP used data gathered during previous industry surveys in the central Alaskan Beaufort Sea to develop specific seal sighting rates. Those sighting rates were then multiplied by the total number of hours that each source vessel would be operating during the data acquisition periods. For species that are less common in the proposed survey areas, BP estimated small numbers of takes based on limited presence data. We do not expect the proposed survey activities to impact rates of recruitment or survival for any affected species or stock. Further, the survey activities would not adversely affect marine mammal habitat.

Table 8. Proposed Level B harassment take levels, species or stock abundance, and percentage of population proposed to be taken for BP's proposed Prudhoe Bay 3D OBS seismic survey.

Species	Proposed Level B Take	Abundance	Percentage of Population
Beluga whale	75	39,258	0.19
Killer whale	3	552	0.54
Harbor porpoise	3	48,215	0.01
Bowhead whale	6	16,892	0.04
Gray whale	3	19,126	0.02
Bearded seal	87	155,000	0.06
Ringed seal	324	300,000	0.11
Spotted seal	103	141,479	0.07
Ribbon seal	3	49,000	0.01

Table 9. Proposed Level B harassment take levels, species or stock abundance, and percentage of population proposed to be taken for BP's proposed Foggy Island Bay shallow geohazard survey.

Species	Proposed Level B Take	Abundance	Percentage of Population
Beluga whale	75	39,258	0.19
Killer whale	1	552	0.18
Harbor porpoise	1	48,215	>0.01
Bowhead whale	1	16,892	0.01
Gray whale	1	19,126	0.01
Bearded seal	19	155,000	0.01
Ringed seal	71	300,000	0.02
Spotted seal	23	141,479	0.02
Ribbon seal	1	49,000	>0.01

4.1.3. Impacts on Subsistence

Under Alternative 1 (the Preferred Alternative), BP's seismic and shallow geohazard surveys in the central Alaskan Beaufort Sea are expected to have minor and temporary effects on subsistence wildlife and marine mammals in the area. Sound from survey activities and array guns might temporarily displace wildlife from the area, but animals are expected to return to the area following the cessation of use of sound sources during survey activities.

Hunters from Nuiqsut who hunt bowhead whales are the closest to the proposed project areas. However, their primary subsistence hunt of bowhead whales on Cross Island occurs in early September. BP has proposed to cease all sound source operations by midnight on August 25 to avoid impacting bowhead whales and to avoid interfering with hunters in traditional hunting ground areas. BP's activities are not anticipated to impact fall bowhead whale hunts in Kaktovik and Barrow based on the far distances between the activities and the hunting grounds and the fact that BP will cease all sound source operations before the start of the fall hunts.

BP's activities begin after the spring hunts have concluded. While some seal hunts occur in the summer, they are spatially dispersed from BP's proposed surveys. Moreover, BP will implement mitigation measures to avoid impacting marine mammal species hunted by Native Alaskans. Lastly, BP will not place any physical barriers between hunters and the animals. BP proposes to work closely with the closest affected communities and support Communications Centers and employ local Inupiat Communicators.

BP concluded, and NMFS agrees, that the size of the affected area, mitigation measures, and input from the consultations from Alaska Natives should result in the proposed surveys having no unmitigable adverse impact on the availability of marine mammals for subsistence uses. BP and NMFS recognize the importance of ensuring that Alaska Native Organizations and federally recognized tribes are informed, engaged, and involved during the permitting process and will continue to work with the Alaska Native Organizations and tribes to discuss their operations and activities.

NMFS anticipates that any effects from BP's proposed surveys on marine mammals would be short-term, site specific, and limited to inconsequential changes in behavior and mild stress responses. NMFS does not anticipate that the authorized taking of affected species or stocks would reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (1) Causing the marine mammals to abandon or avoid hunting areas; (2) directly displacing subsistence users; or (3) placing physical barriers between the marine mammals and the subsistence hunters; and that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

4.2. Effects of Alternative 2 – No Action Alternative

Under the No Action Alternative, we would not issue Authorizations to BP. As a result, BP would not receive an exemption from the MMPA prohibitions against the take of marine mammals and would be in violation of the MMPA if take of marine mammals occurs.

The impacts to elements of the human environment resulting from the No Action alternative—conducting the 3D OBS seismic survey and shallow geohazard survey programs in the absence of required protective measures for marine mammals under the MMPA—would be greater than those impacts resulting from Alternative 1, the Preferred Alternative.

4.2.1. Impacts to Marine Mammal Habitat

Under the No Action Alternative, the surveys would have no additive effects on the physical environment beyond those resulting from BP's activities, which we evaluated in the referenced documents. This Alternative would result in similar effects on the physical environment as Alternative 1. The only potential difference in impacts to marine mammal habitat under the no action alternative would be

additional ensonification of the marine environment during use of the mitigation gun because BP would not be required to increase the shot interval.

4.2.2. Impacts to Marine Mammals

Under the No Action Alternative, BP's activities would likely result in increased amounts of Level B harassment to marine mammals and possibly takes by injury (Level A harassment), serious injury, or mortality—specifically related to acoustic stimuli—due to the absence of mitigation and monitoring measures required under the Authorizations. While it is difficult to provide an exact number of takes that might occur under the No Action Alternative, the numbers would be expected to be larger than those presented in Tables 6 and 7 above because BP would not be required to abide by seasonal restrictions to reduce the number of takes.

If the activities proceeded without the protective measures and reporting requirements required by final Authorizations under the MMPA, the direct, indirect, or cumulative effects on the human environment of not issuing the Authorizations would include the following:

- Marine mammals within the survey areas could experience injury (Level A harassment) and potentially serious injury or mortality. The lack of mitigation measures required in the Authorizations could lead to vessels not altering course around marine mammals, not ramping up or powering or shutting down airguns when marine mammals are within applicable injury harassment zones, and no seasonal restrictions on active sound source usage;
- Increases in the number of behavioral responses and frequency of changes in animal distribution because of the lack of mitigation measures required in the Authorizations. Thus, the incidental take of marine mammals would likely occur at higher levels than we have already identified and evaluated in our *Federal Register* notices on the proposed Authorizations; and
- We would not be able to obtain the monitoring and reporting data needed to assess the anticipated impact of the proposed survey activities upon the species or stock; and increased knowledge of the species as required under the MMPA.

4.2.3. Impacts to Subsistence

Under the No Action Alternative, the survey would have no additive effects on subsistence beyond those resulting from BP's activities, which we evaluated in the referenced documents. The main difference under this alternative is that BP would not be required to cease active sound source operational activities by midnight August 25. If BP continued such activities beyond that date without implementing other mitigation measures, there could be some interference with the fall bowhead whale hunt on Cross Island. Moreover, BP would not be required to ensure availability of marine mammals for subsistence uses and would not be required to implement mitigation measures to that effect.

4.3. Compliance with Necessary Laws – Necessary Federal Permits

We have determined that the issuance of the Authorizations is consistent with the applicable requirements of the MMPA, ESA, MSFMCA, and our regulations. Please refer to Section 1.4 of this EA for more information.

4.4. Unavoidable Adverse Impacts

BP's applications, our notices of proposed Authorizations, and other environmental analyses identified previously summarize unavoidable adverse impacts to marine mammals or the populations to which they

belong or on their habitats, as well as subsistence uses of marine mammals, occurring in the survey areas. We incorporate those documents by reference.

We acknowledge that the incidental take authorized would potentially result in unavoidable adverse impacts. However, we do not expect BP's activities to have adverse consequences on the viability of marine mammals in the Beaufort Sea or on the availability of marine mammals for subsistence uses, and we do not expect the marine mammal populations in that area to experience reductions in reproduction, numbers, or distribution that might appreciably reduce their likelihood of surviving and recovering in the wild. We expect that the numbers of individuals of all species taken by harassment would be small (relative to species or stock abundance), that the surveys and the take resulting from the survey activities would have a negligible impact on the affected species or stocks of marine mammals, and that there would not be an unmitigable adverse impact to subsistence uses of marine mammals in the Beaufort Sea.

4.5. Cumulative Effects

NEPA defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR §1508.7). Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

The proposed seismic and shallow geohazard surveys would add two more, albeit temporary, industrial activities to the central Alaskan Beaufort Sea. These activities would be limited to a small area of the central Alaskan Beaufort Sea for a relatively short period of time, and there would be no objects or materials permanently released into the water column. This section provides a brief summary of the human-related activities affecting the marine mammal species in the action area.

4.5.1. Past Commercial Whaling

Commercial hunting between 1848 and 1915 caused severe depletion of the BCB bowhead population. This industrial-level commercial hunting is no longer occurring and is not expected to occur again. Woody and Botkin (1993) estimated that the historic abundance of bowheads in this population was between 10,400 and 23,000 whales in 1848, before the advent of commercial whaling. Woody and Botkin (1993) estimated between 1,000 and 3,000 animals remained in 1914, near the end of the commercial-whaling period. As noted in Section 3.2.2.1 of this EA, data indicate that the BCB stock of bowheads is increasing in abundance. Neither of the alternatives considered would have a direct or indirect effect on the historical commercial whaling of bowhead whales. None of the alternatives would authorize takes by injury, serious injury, or mortality of bowhead whales, and neither of the proposed surveys would be expected to lead to future commercial whaling.

4.5.2. Subsistence Hunting

4.5.2.1. Bowhead Whales

Indigenous peoples of the Arctic and Subarctic have been hunting bowhead whales for at least 2,000 years (Stoker and Krupnik 1993). Thus, subsistence hunting is not a new contributor to cumulative effects on this population. There is no indication that, prior to commercial whaling, subsistence whaling caused significant adverse effects at the population level. However, modern technology has changed the potential for any lethal hunting of this whale to cause population-level adverse effects if unregulated. Under the

authority of the International Whaling Commission (IWC), the subsistence take from this population has been regulated by a quota system since 1977. Federal authority for cooperative management of the Eskimo subsistence hunt is shared with the Alaska Eskimo Whaling Commission through a cooperative agreement between the Alaska Eskimo Whaling Commission and NMFS.

The sustainable take of bowhead whales by indigenous hunters represents the largest known human-related cause of mortality in this population at the present time. Available information suggests that it is likely to remain so for the foreseeable future. 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. Subsistence take, which all available evidence indicates is sustainable, is monitored, managed, and regulated, and helps to determine the resilience of the population to other effecters that could potentially cause lethal takes. The sustained growth of the BCB bowhead stock indicates that the level of subsistence take has been sustainable. Because the quota for the hunt is tied to the population size and population parameters (IWC, 2003; NMFS, 2003, 2008), it is unlikely this source of mortality will contribute to a significant adverse effect on the recovery and long-term viability of this population.

Currently, Alaskan Native hunters from 11 villages harvest bowheads for subsistence and cultural purposes under a quota authorized by the IWC. Chukotkan Native whalers from Russia also are authorized to harvest bowhead whales under the same authorized quota. Bowheads are hunted at Gambell and Savoonga on St. Lawrence Island, and along the Chukotkan coast. On the northward spring migration, harvests may occur by the villages of Wales, Little Diomede, Kivalina, Point Hope, Point Lay, Wainwright, and Barrow. During their westward migration in autumn, whales are harvested by Kaktovik, Nuiqsut, Barrow, and Wainwright. At St. Lawrence Island, fall migrants can be hunted as late as December (IWC, 2004). The status of the population is closely monitored, and these activities are closely regulated.

There are adverse impacts of the hunting to bowhead whales in addition to the death of animals that are successfully hunted and the serious injury of animals that are struck but not immediately killed. Available evidence indicates that subsistence hunting causes disturbance to the other whales, changes in their behavior, and sometimes temporary effects on habitat use, including migration paths. Modern subsistence hunting represents a source of noise and disturbance to the whales during the following periods and in the following areas: during their northward spring migration in the Bering Sea, the Chukchi Sea in the spring lead system, and in the Beaufort Sea spring lead system near Barrow; their fall westward migration in subsistence hunting areas associated with hunting from Kaktovik, Cross Island, and Barrow; hunting along the Chukotka coast; and hunting in wintering areas near St. Lawrence Island. Lowry et al. (2004) reported that indigenous hunters in the Beaufort Sea sometimes hunt in areas where whales are aggregated for feeding. When a subsistence hunt is successful, it results in the death of a bowhead. Data on strike and harvested levels indicate that whales are not always immediately killed when struck, and some whales are struck but cannot be harvested. Whales in the vicinity of the struck whale could be disturbed by the sound of the explosive harpoon used in the hunt, the boat motors, and any sounds made by the injured whale.

Noise and disturbance from subsistence hunting serves as a seasonally and geographically predictable source of noise and disturbance to which other noise and disturbance sources, such as shipping and oil

and gas-related activities, add. To the extent such activities occur in the same habitats during the period of whale migration, even if the activities (for example, hunting and shipping) themselves do not occur simultaneously, cumulative effects from all noise and disturbance could affect whale habitat use. Subsistence hunting attaches a strong adverse association to human noise for any whale that has been in the vicinity when other whales were struck. None of the alternatives would increase the risk of impacts from subsistence hunts of bowhead whales.

4.5.2.2. Beluga Whales

The subsistence take of beluga whales within U.S. waters is reported by the Alaska Beluga Whale Committee. The annual subsistence take of the Beaufort Sea stock of beluga whales by Alaska Natives averaged 26 belugas during the 5-year period from 2005 to 2009 (Allen and Angliss, 2013). The annual subsistence take of Eastern Chukchi Sea stock of beluga whales by Alaska Natives averaged 94 belugas landed during the 5-year period 2005 to 2009 based on reports from Alaska Beluga Whale Committee representatives and on-site harvest monitoring (Allen and Angliss, 2013). Data on beluga that were struck and lost have not been quantified and are not included in these estimates (Allen and Angliss, 2013). None of the alternatives would increase the risk of impacts from subsistence hunts of beluga whales.

4.5.2.3. Ice Seals

The Division of Subsistence, Alaska Department of Fish and Game (ADF&G) maintains a database that provides additional information on the subsistence harvest of ice seals in different regions of Alaska (ADF&G 2000a,b). Information on subsistence harvest of bearded seals has been compiled for 129 villages from reports from the Division of Subsistence (Coffing et al., 1998; Georgette et al., 1998) and a report from the Eskimo Walrus Commission (Sherrod, 1982). Data were lacking for 22 villages; their harvests were estimated using the annual per capita rates of subsistence harvest from a nearby village. As of August 2000, the subsistence harvest database indicated that the estimated number of bearded, ribbon, ringed, and spotted seals harvested for subsistence use per year are 6,788, 193, 9,567, and 244, respectively.

At this time, there are no efforts to quantify the current level of harvest of bearded seals by all Alaska communities. However, the USFWS collects information on the level of ice seal harvest in five villages during their Walrus Harvest Monitoring Program. Results from this program indicated that an average of 239 bearded seals were harvested annually in Little Diomede, Gambell, Savoonga, Shishmaref, and Wales from 2000 to 2004, 13 ribbon seals from 1999 to 2003, and 47 ringed seals from 1998 to 2003 (Allen and Angliss, 2013). Since 2005, harvest data are only available from St. Lawrence Island (Gambell and Savoonga) due to lack of walrus harvest monitoring in areas previously monitored. There were 21 bearded seals harvested during the walrus harvest monitoring period on St. Lawrence Island in 2005, 41 in 2006, and 82 in 2007. There were no ringed seals harvested on St. Lawrence Island in 2005, 1 in 2006, and 1 in 2007. None of the alternatives would increase the risk of impacts from subsistence hunts of ice seals.

4.5.3. Gas and Oil Development

Currently, there are several gas and oil development projects in the proposed action area, and it is likely that future gas and oil development will continue to take place in the action area. NMFS' 2012 EA for a similar action contains a full description of past oil and gas exploration and development activities in the U.S. Beaufort and Chukchi Seas. In summary, geophysical and oil development activities have been

occurring in this region since the 1960s and 1970s. Since 2006, NMFS has issued more than a dozen Authorizations for the take of marine mammals incidental to geophysical surveys and drilling activities. Such activities are projected to occur into the foreseeable future. In addition to the two surveys contemplated in the proposed action of this EA, NMFS has received a request from another company to conduct a seismic survey in the Beaufort Sea. This survey would occur in the general vicinity of the two surveys proposed in this EA; however, it would occur after these two surveys ended.

Impacts from gas and oil development include increased noise from seismic and drilling activity, vessel and air traffic and well drilling; discharge of wastewater; habitat loss from the construction of oil and gas facilities; and contaminated food sources and/or injury from a natural gas blowout or oil spill. The risk of these impacts may increase as oil and gas development increases; however, new development will undergo consultation and permitting requirements prior to exploration and development. If Authorizations are issued to these other applicants, they would be required to implement mitigation and monitoring measures to reduce impacts to marine mammals and their habitat in the area and would be subject to the same MMPA and ESA standards.

Support vessels are required for gas and oil development to transport supplies and products to and from the facilities. Not only will the support vessels from increased gas and oil development likely increase noise in the action area, there is a potential for a slightly increased risk of ship strikes; however, ship strikes have not been definitively confirmed in the Beaufort Sea, and monitoring measures should reduce this risk by placing visual monitors on ships to look out for marine mammals.

4.5.4. Climate Change

The 2007 Intergovernmental Panel on Climate Change (IPCC) concluded that there is very strong evidence for global warming and associated weather changes and that humans have “very likely” contributed to the problem through burning fossil fuels and adding other “greenhouse gases” to the atmosphere (IPCC, 2007). This study involved numerous models to predict changes in temperature, sea level, ice pack dynamics, and other parameters under a variety of future conditions, including different scenarios for how human populations respond to the implications of the study.

Evidence of climate change in the past few decades, commonly referred to as global warming, has accumulated from a variety of geophysical, biological, oceanographic, and atmospheric sources. The scientific evidence indicates that average air, land, and sea temperatures are increasing at an accelerating rate. Although climate changes have been documented over large areas of the world, the changes are not uniform and affect different areas in different ways and intensities. Arctic regions have experienced some of the largest changes, with major implications for the marine environment as well as for coastal communities. Recent assessments of climate change, conducted by international teams of scientists (Gitay et al., 2002 for the IPCC; (IPCC) Arctic Climate Impact Assessment, 2004; IPCC, 2007), have reached several conclusions of consequence for this EA:

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

- Arctic sea ice thickness has declined by about 40 percent during the late summer and early autumn in the last three decades of the 20th century.

Marine mammals are classified as sentinel species because they are good indicators of environmental change. Arctic marine mammals are ideal indicator species for climate change, due to their circumpolar distribution and close association with ice formation. NMFS recognizes that warming of the Arctic, which results in the diminishing of ice, could be a cause for concern to marine mammals. In the Beaufort Sea, marine mammal distribution is dependent upon ice formation and prey availability, among other factors. For example, belugas often travel just along the ice pack and feed on prey beneath it (Richardson et al., 1990, 1991). Any loss of ice could result in prey distribution changes or loss; however, cetaceans do not use ice for resting, reproduction, or rearing of young like pinnipeds.

It is not clear how governments and individuals will respond or how much of these future efforts will reduce greenhouse gas emissions. Although the intensity of climate changes will depend on how quickly and deeply humanity responds, the models predict that the climate changes observed in the past 30 years will continue at the same or increasing rates for at least 20 years. Although NMFS recognizes that climate change is a concern for the sustainability of the entire ecosystem in the Beaufort Sea, it is unclear at this time the full extent to which climate change will affect marine mammal species. Nonetheless, we expect that ongoing and future BP activities in the Beaufort Sea and the issuance of two Authorizations to BP would not result in any noticeable contributions to climate change. Furthermore, there will be no additive or synergistic effects from climate change on the marine mammals listed in the Authorizations resulting from the authorization of take.

4.5.5. Conclusion

Based on the summation of activity in the area provided in this section, NMFS determined that the incremental impact of two Authorizations for the proposed BP surveys in the Beaufort Sea would not be expected to result in a cumulative significant impact to the human environment from past, present, and future activities. The potential impacts to marine mammals, their habitats, and the human environment in general are expected to be minimal based on the limited and temporary noise footprint and mitigation and monitoring requirements of the Authorizations.

Chapter 5 List of Preparers and Agencies Consulted

Agencies Consulted

No other persons or agencies were consulted in preparation of this EA.

Prepared By

Candace A. Nachman
Fishery Biologist
Permits and Conservation Division
Office of Protected Resources, NOAA/National Marine Fisheries Service

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