

Outer Continental Shelf Oil and Gas Leasing Program: 2012-2017

Final Programmatic Environmental Impact Statement

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Outer Continental Shelf Oil and Gas Leasing Program: 2012-2017

**Final Programmatic Environmental Impact Statement
Volume 1**

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ABBREVIATIONS AND ACRONYMS

ACSAR	Atlantic continental slope and rise
ABC	American Bird Conservancy
ABM	Alabama beach mouse
ACC	Arctic Coastal Current
ACIA	Arctic Climate Impact Assessment
ACMP	Alaska Coastal Management Program
ACP	Arctic Coastal Plain
ADCED	Alaska Department of Community and Economic Development
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AEB	Aleutian East Borough
AEO	Annual Energy Outlook
AER	Annual Energy Review
AEWC	Alaska Eskimo Whaling Commission
AFB	Air Force Base
AFN	Alaska Federation of Natives
AFSC	Alaska Fisheries Science Center
AHTS	anchor handling towing supply
Alaska OHA	Alaska Office of History and Archaeology
AMMP	adaptive mitigation and management plan
ANCSA	<i>Alaska Native Claims Settlement Act of 1971</i>
ANILCA	Alaska National Interest Lands Conservation Act
ANIMIDA	Arctic Nearshore Impact Monitoring in Development Area
ANSC	Aleutian North Slope Current
ANSCA	Alaska Native Claims Settlement Act
ANWR	Arctic National Wildlife Refuge
AO	Arctic Oscillation
AOC	Area of Concern
AOGA	Alaska Oil and Gas Association
APD	Application for Permit to Drill
API	American Petroleum Institute
APTA	American Public Transportation Association
ARCSEES	Arctic Science Engineering Education for Sustainability
ARRT	Alaska Regional Response Team
BBB	Bristol Bay Borough
Bbbl	billion barrels
bbbl	barrels
bbbl/yr	barrels per year
BBO	billion barrels of oil
BBOE	billion barrels of oil equivalent
Bcf	billion cubic feet

BCNP	Big Cypress National Preserve
BLM	Bureau of Land Management (USDOJ)
BNWR	Breton National Wildlife Refuge
BOP	blowout preventer
B.P.	before present
bpd	barrels per day
BSAI	Bering Sea and Aleutian Islands, Alaska
BTEX	benzene, toluene, ethylbenzene and xylene
BPXA	British Petroleum (Exploration) Alaska
°C	degrees Centigrade
¹⁴ C	carbon-14
CAA	Clean Air Act or conflict avoidance agreement
CAFE	corporate average fuel economy
CAH	Central Arctic Herd
CBM	Choctawhatchee beach mouse
CCP	Comprehensive Conservation Plan
CDE	catastrophic discharge event
CEC	Commission on Environmental Cooperation
CEI	Coastal Environments, Inc.
CEQ	Council on Environmental Quality
CER	categorical exclusion review
CFC	chlorofluorocarbons
CFR	Code of Federal Regulations
CH ₄	methane
CIAP	Coastal Impact Assistance Program
CIBSE	Chartered Institute of Building Services Engineers
CIRI	Cook Inlet Region, Inc.
cm	centimeter
CMP	coastal management program
cm/s	centimeter per second
CMSP	Coastal and Marine Spatial Planning
CO	carbon monoxide
CO ₂	carbon dioxide
COE	Corps of Engineers (U.S. Army)
CPA	Central Planning Area
CPUE	catch per unit effort
CVI	coastal vulnerability index
CWA	Clean Water Act
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
dB	decibel
dB re 1 μPa-m	dB referenced to 1 micropascal within 1 meter of the source
DCS	Drilling, Completion, and Stimulation Program

DDT	dichlorodiphenyltrichloroethane
DHHS	Department of Health and Human Services
DIN	dissolved inorganic nitrogen
DIP	dissolved inorganic phosphorus
DLP	defense of life and property
DOSS	dioctylsulfosuccinate
DP	dynamic positioning
DPnB	dipropylene glycol n-butyl ether
DPS	distinct population segment
DTNP	Dry Tortugas National Preserve
DWH	Deepwater Horizon
DWH event	Deepwater Horizon MC252 Spill of National Significance
E&D	exploration and development
EA	environmental assessment
ECOS	Environmental Conservation Online System
EDA	estuarine drainage area
EEZ	Exclusive Economic Zone
EFH	essential fisheries habitat
EIA	Energy Information Administration; economic impact area
EIS	environmental impact statement
EJ	environmental justice
ENP	Everglades National Park
ENSO	El Niño-Southern Oscillation
EO	Executive Order
ER	Ecosystem Resources
EROS	explosive removal of offshore structures
ERS	Economic Research Service (USDOA)
ESA	Endangered Species Act
ESI	Environmental Sensitivity Index
ESP	Environmental Studies Program
ESPIS	Environmental Studies Program Information System
EV	electric vehicle
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FAD	fish aggregation device
FCMA	Fishery Conservation and Management Act of 1976
FDA	fluvial drainage area
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FGBNMS	Flower Garden Banks National Marine Sanctuary
FKNMS	Florida Keys National Marine Sanctuary
FLIR	Forward Looking Infrared Radar
FLM	Federal land manager
FMC	fishery management council

FMP	fishery management plan
FOSC	Federal On-Scene Coordinator
FPSO	floating production, storage, and offloading
FR	Federal Register
FS	Forest Service (USDOA)
FSB	Federal Subsistence Board
FWPCA	Federal Water Pollution Control Act
FWS	Fish and Wildlife Service (USDOI)
GAO	Government Accountability Office
GCCF	Gulf Coast Claims Facility
GHG	greenhouse gas
GINS	Gulf Island National Seashore
GMFMC	Gulf of Mexico Fishery Management Council
GOA	Gulf of Alaska
GOM	Gulf of Mexico
GRS	geographic response strategy
GSA	Geographic Society of America
GTP	Gas Treatment Plant
GWP	global warming potential
H ₂ S	hydrogen sulfide
ha	hectare
HAPC	habitat area of particular concern
HAPs	hazardous air pollutants
HCA	Habitat Conservation Area
HDDC	high density deepwater communities
HIA	Health Impact Assessment
HPA	Habitat Protection Area
HSE	Health, Safety, and Environment
HVAC	heating, ventilation, air conditioning
Hz	hertz
IBA	Important Bird Area
ICAS	Inupiat Community of the Arctic Slope
IECC	International Energy Conservation Code
IOSC	International Oil Spill Conference
IPCC	Intergovernmental Panel on Climate Change
IPHC	International Pacific Halibut Commission
IUCN	International Union Conservation Network
IWC	International Whaling Commission
JBER	Joint Base Elmendorf-Richardson
JIP	Joint Industry Program
kHz	kilohertz
KIB	Kodiak Island Borough

km	kilometer
km ²	square kilometer
km/hr	kilometers per hour
KPB	Kenai Peninsula Borough
kwh	kilowatt hours
lb	pounds
LCI	Lower Cook Inlet
LLC	Limited Liability Corporation
LMA	Labor Market Area
LME	Large Marine Ecoregion
LNG	liquefied natural gas
LOOP	Louisiana Offshore Oil Port
LPB	Lake and Peninsula Borough
LPG	liquid petroleum gases
LRRS	Long-Range Radar Site
LSU CMI	Louisiana State University Coastal Marine Institute
LCWCRTF	Louisiana Coastal Wetlands Conservation and Restoration Task Force
m	meter
m ³	cubic meter
m ³ /s	cubic meter per second
m/s	meters per second
m/yr	meters per year
MAFLA	Mississippi, Alabama, and Florida
MAG-PLAN	MMS Alaska-GOM Modeling Using IMPLAN
MARAD	Maritime Administration
MARB	Mississippi and Atchafalaya River Basins
MARPOL	International Convention for the Prevention of Pollution from Ships
Mbbl	million barrels
MBTA	Migratory Bird Treaty Act
MCF	million cubic feet
MECS	Manufacturing Energy Consumption Survey
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mi ²	square miles
mi ² /yr	square miles per year
ML	Richter low magnitude
ml/L	milliliters per liter
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service (USDOJ)
MOA	Memorandum of Agreement
MODU	mobile offshore drilling unit
MOU	Memorandum of Understanding
MPA	Marine Protected Area
mph	miles per hour

MPI	Main Production Island
MPPRCA	Marine Plastic Pollution Research and Control Act
MPRSA	Marine Protection Research and Sanctuaries Act
MRFSS	Marine Recreational Fisheries Statistics Survey (NMFS)
MSA	metropolitan statistical area
MSP	marine spatial planning
M _w	moment magnitude
NAA	No Action Alternative
NAAQS	National Ambient Air Quality Standards
NAFTA	North Atlantic Free Trade Agreement
NAO	North Atlantic Oscillation
NASA	National Aeronautics and Space Administration
NAST	National Assessment Synthesis Team
NCP	National Contingency Plan
NDBC	National Data Buoy Center
NEMS	National Energy Modeling System
NEPA	National Environmental Policy Act
NGL	natural gas liquid
NGO	non-governmental organization
NHPA	National Historic Preservation Act
NIC	National Incident Command
NIOSH	National Institute for Occupational Safety and Health
NM	nautical miles
NMFS	National Marine Fisheries Service (USDOC, NOAA)
N ₂ O	nitrous oxide
NO ₂	nitrogen dioxide
NO _x	nitrogen oxide
NOAA	National Oceanic and Atmospheric Administration (USDOC)
NOC	National Ocean Council
NOP	National Policy for Stewardship of the Ocean, Our Coasts, and the Great Lakes
NORM	naturally occurring radioactive material
NO _x	nitrogen oxides
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPFMC	North Pacific Fishery Management Council
NPR-A	National Petroleum Reserve-Alaska
NPS	National Park Service (USDOJ)
NRC	National Research Council
NRDA	Natural Resource Damage Assessment
NRDC	National Resources Defense Council
NREL	National Renewable Energy Laboratory
NRHP	<i>National Register of Historic Places</i>
NRP-A	National Petroleum Preserve-Alaska
NRC	National Research Council

NSB	North Slope Borough
NSRE	National Survey on Recreation and the Environment (NOAA)
NTL	Notice to Lessees
NWA	national wilderness area
NWAB	Northwest Arctic Borough
NWR	national wildlife refuge
NWS	National Weather Service
O&G	oil and gas
O ₃	ozone
OBIS-SEAMAP	Ocean Biogeographic Information System-Spatial Ecological Analysis of Megavertebrate Populations
OBM	oil-based mud
OCD	Offshore and Coastal Dispersion Model
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
ODMDS	ocean dredged material disposal sites
OECM	Offshore Environmental Cost Model
OGP	International Association of Oil and Gas Producers
OOC	Offshore Operators Committee
OPA 90	Oil Pollution Act of 1990
OPAREA	(military) operating area
ORPC	Ocean Renewable Power Company
OSAT	Operational Science Advisory Team of the Unified Area Command
OSRA	Oil Spill Risk Analysis
OSRF	oil-spill financial responsibility
OSRP	oil spill response plan
OSRO	Oil Spill Response Organizations
OSV	offshore supply vessel
PAH	polyaromatic hydrocarbons
Pb	lead
PCB	polychlorinated biphenyl
PCH	Porcupine Caribou Herd
PCPI	per capita personal income
PDO	Pacific Decadal Oscillation
PEIS	programmatic environmental impact statement
PeMex	Petroleos Mexicanos
PFP	Proposed Final Program
PHEV	plug-in hybrid electric vehicle
PICES	North Pacific Marine Science Organization
PINS	Padre Island National Seashore
PKBM	Perdido Key beach mouse
PM	particulate matter
PM ₁₀	particulate matter less than 10 microns in diameter
PM _{2.5}	fine particulates less than 2.5 microns in diameter

ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PSD	Prevention of Significant Deterioration
PTS	permanent threshold shift
RCRA	Resource Conservation and Recovery Act
RHA	Rivers and Harbors Act
ROD	record of decision
ROP	required operating procedure
ROV	remote operating vehicle
ROW	right-of-way
RRT	Regional Response Team
SAAQS	State Ambient Air Quality Standards
SABM	St. Andrew's beach mouse
SAMP	Special Area Management Plan
SBF	synthetic-based drill fluids
SCAT	Shoreline Cleanup Assessment Team
SDI	Satellite Drilling Island
SEED	Shelf Energetics and Exchange Dynamics
SEMS	Safety and Environmental Management Plan
SETAC	Society for Environmental Toxicology and Chemistry
SIP	State Implementation Plan
SMB	synthetic-based muds
SO ₂	sulfur dioxide
SO _x	sulfur oxides
SOA	secondary organic aerosol
SOAR	Synthesis of Arctic Research
SONS	spill of national significance
SST	sea-surface temperature
SSDC	single steel drilling caisson
SU	subsistence use
SUA	Special Use Airspace
SUSIO	State University System of Florida Institute of Oceanography
SWSS	Sperm Whale Seismic Study
t	metric ton (tonne)
TAPS	Trans-Alaska Pipeline System
TAR	Technology Assessment and Research
TATEC	Turnagain Arm Tidal Energy Corporation
Tbbl	trillion barrels
tcf	trillion cubic feet
TcfG	trillion cubic feet of gas
TcfGE	trillion cubic feet of gas equivalent
TEIA	Transboundary Environmental Impact Assessment

TERA	Troy Ecological Research Associates
Tg	teragram
TLH	Teshekpuk Lake Herd
TMDL	total maximum daily load
TLSA	Teshekpuk Lake Special Area
TPWD	Texas Parks and Wildlife Department
TTI/E	Ten Thousand Islands/Everglades Unit
TTS	temporary threshold shift
UCI	Upper Cook Inlet
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
ULSD	ultra-low-sulfur diesel
μm	micrometer
UME	unusual mortality event
UNEP	United Nations Environment Programme
μPa	microPascal
$\mu\text{Pa-m}$	microPascal at 1 meter
USAF	U.S. Air Force
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USDOC	U.S. Department of Commerce
USDOD	U.S. Department of Defense
USDOE	U.S. Department of Energy
USDOJ	U.S. Department of the Interior
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service (USDOJ)
USGS	U.S. Geological Survey (USDOJ)
VLOS	very large oil spill
VOC	volatile organic compound
WA	Wilderness Area
WAH	Western Arctic Herd
WBF	water-based fluid
WBM	water-based muds
WCID	Well Construction Interface Document
WEA	Wind Energy Area
WPA	Western Planning Area
yd^3	cubic yards

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SUMMARY

The Proposed Action

Section 18 of the Outer Continental Shelf Lands Act (OCSLA) requires the Secretary of the Interior to prepare and maintain a schedule of proposed OCS oil and gas lease sales determined to “best meet national energy needs for the 5-year period following its approval or reapproval.” The Proposed Final Program establishes a schedule that the U.S. Department of the Interior (USDOJ) will use as a basis for considering where and when leasing might be appropriate over a 5-year period. The USDOJ proposes 15 lease sales in six of the Outer Continental Shelf (OCS) Planning Areas in the Gulf of Mexico (GOM) and offshore Alaska during the period 2012-2017 (Table S-1). Five lease sales are proposed for each of the Central and Western GOM Planning Areas, with one to two lease sales in the extreme western portion of the Eastern GOM Planning Area. Scheduled in the Alaska region are one sale with two whaling deferrals in the Beaufort Sea Planning Area, one sale with a 40-km (25-mi) coastal buffer in the Chukchi Sea Planning Area, and one sale in the Cook Inlet Planning Area. No lease sales are proposed off the U.S. east and west coasts. The later scheduling of the potential sales in the Beaufort Sea, Chukchi Sea, and Cook Inlet Planning Areas represents a strategic approach to leasing in the Alaska region and is structured to allow time for further work in critical areas such as further scientific study and environmental assessment, further information collection on the geologic conditions and resource potential in the area through exploration under existing leases, and further development of oil spill response preparedness and infrastructure capabilities. During implementation of the 2012-2017 OCS Oil and Gas Leasing Program (hereafter referred to as “the Program”), this will also allow the Secretary of the Interior to develop a more tailored vision for leasing in the Arctic addressing specific resource opportunities and the special environmental and subsistence concerns. A decision to adopt the Program proposal is not a decision to hold lease sales, issue specific leases, or to authorize any drilling or development.

Oil and gas activities may occur on OCS leases after a lease sale is held pursuant to this proposed action, and these activities may extend over a period of 40 to 50 years. These activities may include (1) seismic surveys; (2) drilling oil and natural gas exploration and production wells; (3) installation and operation of offshore platforms and pipelines, onshore pipelines, and support facilities; and (4) transport of hydrocarbons using tankers or pipelines.

TABLE S-1 Proposed 2012-2017 Program Lease Sale Schedule

OCS Planning Area	Proposed Lease Sale Year
Western Gulf of Mexico	Annual sales beginning in 2012
Central Gulf of Mexico	Annual sales beginning in 2013
Eastern Gulf of Mexico	2014, 2016
Cook Inlet	2016
Beaufort Sea	2017
Chukchi Sea	2016

Alternatives

Seven alternatives to the Proposed Action Alternative (Alternative 1) are evaluated in this programmatic environmental impact statement (PEIS). Each alternative represents a reduction from the proposed action, differing only in which planning areas (and associated number of lease sales) would be included for possible future lease offerings under the Program.

- **Alternative 2** – Exclude the Eastern GOM Planning Area for the duration of the Program. Leasing in the other five planning areas would be the same as Alternative 1.
- **Alternative 3** – Exclude the Western GOM Planning Area for the duration of the Program. Leasing in the other five planning areas would be the same as Alternative 1.
- **Alternative 4** – Exclude the Central GOM Planning Area for the duration of the Program. Leasing in the other five planning areas would be the same as Alternative 1.
- **Alternative 5** – Exclude the Beaufort Sea Planning Area for the duration of the Program. Leasing in the other five planning areas would be the same as Alternative 1.
- **Alternative 6** – Exclude the Chukchi Sea Planning Area for the duration of the Program. Leasing in the other five planning areas would be the same as Alternative 1.
- **Alternative 7** – Exclude the Cook Inlet Planning Area for the duration of the Program. Leasing in the other five planning areas would be the same as Alternative 1.
- **Alternative 8** – No Action. No lease sales would be conducted in any OCS Planning Area during the period 2012-2017. Exploration, development, and production activities would continue in lease blocks previously leased.

Principal Issues and Concerns

Programmatic Deferrals and Mitigation. Decisions at the 5-year Program stage are, generally speaking, broad-based and focused on determining which areas to include in the Program during what years. Numerous and varied recommendations for more focused leasing, spatial and temporal deferrals, and mitigation were provided in scoping comments and echoed in Draft PEIS comments and in discussions with PEIS cooperating agencies. The PEIS does not analyze specific deferrals and mitigations as alternatives. However, the PEIS includes a substantial presentation of potential mitigation strategies that may be appropriate for further consideration throughout the different stages of the leasing process in different Program areas,

with the goal of ensuring that these strategies are thoroughly considered, analyzed where appropriate, and readied for implementation at the appropriate stage in the process. Since the process for developing and implementing mitigation strategies could require additional research and coordination and consultation over an extended time, the 5-year PEIS serves its planning and tiering function by establishing a process that can be used during the Program to evaluate, track, and provide for stakeholder input into the development of informed mitigation strategies.

Impact-Producing Factors. It is important to note that establishing a schedule of lease sales by itself will have no direct effects on most resources on the OCS. With the exception of pre-sale geophysical surveys used by industry to inform lease bid decisions, most activities that could impact resources would only occur following a lease sale, and then only following approval for exploration and development to be initiated within lease areas. However, all activities would only occur with issuance of a geophysical or geological permit, authorization of ancillary on-lease activities, and/or approval of an exploration or development plan. Because the nature, location, and level of future project-specific oil and gas activities is unknown at this time, the environmental analyses presented in this PEIS are based on reasonable assumptions about future activities and apply to each of the seven action alternatives under consideration for the Program. Estimates of oil and gas resources that might be found in and produced from the areas being considered for leasing provide the basis for making the assumption of the levels of exploration and development that might occur. Each exploration and development scenario contains the major elements of activity needed to support exploration, production, and transportation of oil and gas that may be discovered and found to be economically producible.

Several types of routine oil and gas activities are identified that could cause impacts under the proposed action or alternatives (excluding the No Action Alternative) following subsequent lease sale, plan, or permit considerations. None of the action alternatives, if implemented, would authorize oil and gas exploration and development activities. These activities are, however, evaluated in the PEIS in resource-specific analyses to provide decision-makers with programmatic information regarding the nature and magnitude of potential impacts that may be incurred with development following a lease sale under any of the seven action alternatives. Location- and resource-specific impacts would be evaluated in subsequent lease sale and plan-specific NEPA analyses and decision-making.

The impact-producing factors related to routine OCS activities and evaluated in this PEIS include:

- The disposal of liquid wastes, including drilling fluids (i.e., drill muds), produced water, ballast water, and sanitary and domestic wastewater generated by OCS-related activities.
- Solid waste disposal, including material removed from the well borehole (i.e., drill cuttings), solids produced with the oil and gas (e.g., sands), cement residue, bentonite, and trash and debris (e.g., equipment or tools) accidentally lost.

- Gaseous emissions from offshore and onshore facilities and from construction, support, and transportation vessels and aircraft.
- Noise from seismic surveys, ship and aircraft traffic, pipeline trenching, drilling and production operations, and explosive platform removals.
- Physical impacts from ship and aircraft traffic and use conflicts with oil tankers and barges, supply/support vessels and aircraft, and seismic survey vessels and aircraft.
- Physical emplacement, presence, and removal of facilities including offshore platforms; seafloor pipelines; floating production, storage, and offloading systems; onshore infrastructure such as pipelines, storage, processing, and repair facilities; ports; pipe coating yards; refineries; and petrochemical plants.

Oil Spills. The greatest concern related to oil and gas development under any of the alternatives addressed in this PEIS is that of an accidental oil spill. Spills may be associated with loss of well control, production accidents, transportation failures (e.g., tankers, other vessels, seafloor and onshore pipelines, and storage facilities), and platform accidents. The magnitude and duration of effects from an accidental spill would depend on the location, timing, and volume of the spill; the environmental setting of the spill (e.g., restricted coastal waterway, deepwater pelagic location); and the species (and their ecology) and other sensitive resources exposed to the spilled oil. Spill-response operations could result in short-term disturbance of fauna and human activities in the vicinity of cleanup activities.

Evaluating historical spill data and taking into account the amount of oil production anticipated to occur with exploration and development following leasing, spill scenarios are provided for the GOM, Cook Inlet, Beaufort Sea, and Chukchi Sea Planning Areas. BOEM estimates the number of small (<1,000 bbl) and large (\geq 1,000 bbl) oil spills that are expected during the Program, given historical spill rates and projected OCS activity levels. Most expected spills would be less than 50 bbl in size, and impacts to most resources from such small spills would be negligible to minor, as weathering, dispersion, and other natural processes would be expected to quickly disperse and degrade the spill, limiting exposure of, and effects to, resources in the vicinity of the spill. In addition, the farther from the coast a small spill were to occur, the less likely it would be that the spill would adversely affect coastal and nearshore resources. In contrast, a large spill may be expected to affect more resources, do so over a much larger area and for a much longer period of time, and potentially result in major impacts.

For analytical purposes, the PEIS presents analyses of the effects of varying sizes of oil spills on sensitive resources. While this analysis provides the Secretary of the USDOJ with information about the potential impacts if spills were to occur and contact environmental resources, the analyses cannot predict if, when, or where specific oil spills would occur or whether any spills would contact environmental resources. In all Program areas, the analyses consider the effects of at least one very large, catastrophic spill event, even though the occurrence of such a spill is unexpected, given the estimated drilling and oil production scenario. Again, the analyses of these spills does not mean the USDOJ expects such a catastrophic event to

occur under any of the action alternatives considered in this PEIS; rather, the analyses identify potential impacts to resources that may be incurred, should such a catastrophic discharge event occur, even if it is unlikely that such an event would occur. The effects of a catastrophic discharge event could significantly affect physical, biological, and socioeconomic resources over large areas and for long periods of time.

Major regulatory reforms and advances in drilling and containment technology and practice have occurred and continue to occur following the Deepwater Horizon event, potentially reducing the frequency of oil spills or potential size of oil releases into the environment from OCS operations. The PEIS includes a detailed discussion addressing the risk of catastrophic discharge events, as well as many of the important governmental and industry reforms and improvements under way to further reduce risk and improve safety and environmental performance.

Sensitive Biological and Ecological Resources and Critical Habitats

The Program encompasses large areas in the GOM and portions of the Alaska OCS. These areas constitute diverse marine and coastal environments that support a tremendous diversity of habitats and biota, including species and habitats protected by the Endangered Species Act, Magnuson Stevens Fishery Conservation and Management Act, Migratory Bird Treaty Act, and other Federal and State laws and regulations. At this programmatic stage, it is not possible, or appropriate, to conduct site-specific analyses of all potentially affected resources or identify all relevant mitigation. Therefore, in keeping with NEPA and Council on Environmental Quality (CEQ) regulations, the PEIS focuses on those aspects of marine and coastal resources that are unique, ecologically important, or most susceptible to impacts from offshore oil and gas activities. The PEIS also concentrates on those life stages and habitats that may be most sensitive to routine oil and gas activities, as well as to accidental oil spills.

The identification and evaluation of potential impacts focus on three main categories: animals, plants, and habitats. Among the animal groups evaluated are marine and terrestrial mammals, marine and coastal birds, fish, sea turtles, and benthic invertebrates. Special attention is given to migratory species, species taken commercially and for Alaska Native subsistence (including whales, other marine mammals, fish, and birds), and threatened and endangered species. With respect to habitats, both marine (e.g., corals and chemosynthetic communities) and coastal (e.g., estuaries and wetlands/marshes, dunes) areas are identified and evaluated for possible adverse impacts from OCS oil and gas activities.

Social, Cultural, and Economic Resources

Specific concerns regarding social, cultural, and economic resources include potential impacts on tourism, recreation, commercial and recreational fishing, subsistence harvests, aesthetics, local economies, land and water use conflicts, disproportionate impacts on low-income and minority groups, and disproportionate impacts on Alaska Natives. The social, cultural, and economic topics analyzed in the PEIS are as follows:

- Population, employment, income, and public service issues from the effects of the Program, including issues relating to “boom/bust” economic cycles.
- Land use and infrastructure, including construction of new onshore facilities, and land use and transportation conflicts among the oil and gas activities and other uses.
- Sociocultural systems effects, including concerns about the effects on subsistence resources and activities (e.g., bowhead whale hunting), loss of cultural identity, health impacts including psychological health, and social cost of oil spills.
- Environmental justice (i.e., the potential for disproportionate and high adverse impacts on minority and/or low-income populations [Executive Order 12898]).
- Commercial and recreational fisheries.
- Tourism and recreation, including the use of coastal areas for sightseeing, wildlife observations, swimming, diving, surfing, sunbathing, berry picking and gathering roots and greens, hunting, fishing, clamming and gathering shellfish, boating, and the visual impacts of offshore OCS structures.
- Archaeological resources, including historic shipwrecks and sites inhabited by humans during prehistoric times.

Climate Change

The PEIS considers how climate change, based on the observed changes that have been occurring during the past several decades, may affect baseline conditions of resources over the 40 to 50 year period during which oil and gas activities could occur following lease sales under the Program. The effects of climate change on ecosystems are complex and non-uniform across the globe and vary among atmospheric, terrestrial, and oceanic systems. Considerations of climate change effects in OCS Planning Areas focus on impacts to marine and coastal systems where environmental sensitivities are typically associated with increasing atmospheric and ocean temperatures, sea level rise, and ocean acidification. These general categories of climate change responses are occurring in addition to human-induced pressures related to coastal population densities (e.g., land use changes, pollution, overfishing) and trends of increasing human use of coastal areas. The PEIS presents resource-specific discussions of the affected environment with discussions of the effects of ongoing, observable climate changes for those resources. In addition, the impacts of the continuing trend in climate change during the life of the Program are considered as well.

Summary of Impact Conclusions (Alternatives 1–7)

The analyses in this PEIS describe in detail the nature and extent of potential impacts of future oil and gas activities on the OCS that may occur under the proposed action or any of the action alternatives. Specifically, the PEIS evaluates the potential direct, indirect, and cumulative impacts of routine operations and accidental oil spills. Cumulative effects are addressed in the PEIS, but are not summarized in this Summary. The analyses assume the implementation of all mitigation and other protective measures currently required by statute, regulation, or BOEM policy and practice. One objective of the PEIS is to convey to decision makers and the public the relative extent of potential impacts. Conclusions for most analyses generally indicate the ability of most affected resources to recover from impacts that could result from oil and gas development following leasing.

Under the proposed action, or Alternatives 2 through 7, routine operations associated with each of these phases will have similar impact-producing factors associated with them, and these have “typical” types of impacts (summarized below), regardless of location. The magnitude and importance of those impacts on the resource, however, will be site- and project-specific. The types of impacts identified and discussed below will be similar for each of the alternatives except the No Action Alternative. The principal difference in potential impacts among the action alternatives would be in where those impacts may be incurred, as well as the nature of exposure. Each of the alternatives to the proposed action excludes one of the six planning areas included in the proposed action from the Program; thus, most resources in an excluded planning area would not be expected to be affected by routine operations occurring in other planning areas. Because routine operations include some impacting factors (such as seismic survey noise and support vessel traffic) that may extend beyond planning area boundaries, resources in an excluded planning area may be affected by some of the routine operations associated with development in adjacent planning areas. Similarly, accidental oil spills may be transported from the planning area in which the spill occurs to adjacent planning areas, affecting resources in those other areas.

The six action alternatives to the proposed action each exclude one of the planning areas (Alternatives 2–7). Beneficial environmental effects would be mostly realized in the area(s) excluded. Those beneficial effects could be realized through avoided adverse effects which may otherwise stress environmental resources, sensitive ecosystems, and subsistence practice. Cumulative actions and effects may also be reduced.

The evaluation of a No Action Alternative is required by the regulations implementing NEPA (40 CFR 1502.14(d)). If the Secretary were to adopt this alternative, it would halt OCS pre-sale planning, sales, and new leasing from 2012 to 2017. However, exploration, development, and production stemming from past sales would continue. As demand for energy is not expected to substantially decrease, the energy demand would need to be met by switching energy sources. Environmental effects could occur from other domestic and international energy producing activities, such as non-domestic oil production and tankering, coal extraction and consumption, and hydropower.

Water Quality

In the GOM and Alaska planning areas, routine operations could result in minor to moderate, localized, short-term impacts. Any such impacts would be associated with structure placement and construction (pipelines, platforms), operational discharges (produced water, bilge water, and drill cuttings), and sanitary and domestic wastes. Structure placement and removal could increase suspended sediment loads as a result of bottom disturbance, while operational discharges, sanitary and domestic wastes, and deck drainage could affect chemical water quality. Compliance with National Pollutant Discharge Elimination System (NPDES) permit requirements and U.S. Coast Guard (USCG) regulations would reduce most impacts of routine operations.

The impacts of accidental oil spills could range from minor to major, depending upon the material spilled, spill size, spill location, and remediation activities. Small spills (<1,000 bbl) would likely result in short-term, localized impacts. Impacts from a large oil spill ($\geq 1,000$ bbl) could persist for an extended period of time because of potential remobilization from sediments or if oil were to reach shore and be deposited in wetland and beach sediments or low-energy environments. The speed of natural recovery in the Alaska OCS, as compared to GOM waters, could be slowed by the persistence of oil in cold water temperatures and ice cover. Although unexpected, a catastrophic discharge event (CDE) spill, if one were to occur, would have moderate to major impacts and would affect water quality over a much larger area, including possibly in planning areas adjacent to the one where the spill occurs. The potential for more widespread and long-term water quality impacts may be expected to be greater in cold Alaskan waters, especially under ice-cover conditions. In the Alaska Beaufort Sea and Chukchi Sea Planning Areas, winter conditions (e.g., complete ice cover and extremely cold conditions) could substantially complicate spill response, given current spill control and remediation technologies.

Air Quality

Routine operations affecting air quality in the GOM and Alaska planning areas include emissions from construction equipment; machinery supporting production operations; helicopters and aircraft; marine vessels, including drill ships, production platforms, and oil spill support vessels; and, in Alaska, ice breakers. Only minor impacts to air quality are expected from routine activities under any of the action alternatives. Emissions during routine operations under any of the action alternatives would cause localized increases in concentrations of nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter less than 10 or 2.5 micrometers in diameter (PM₁₀ and PM_{2.5}, respectively), and carbon monoxide (CO) in the planning areas where such activities would occur, although concentrations would not be expected to exceed U.S. Environmental Protection Agency (USEPA) National Ambient Air Quality Standards (NAAQS) and the Prevention of Significant Deterioration (PSD) increments. Increases in ozone may occur, but would be less than 2% of total concentrations. Air quality impacts from oil spills and *in situ* burning would generally be localized and of short duration. Overall, impacts on air quality from oil spills and any spill-response activities are expected to be minor for small spills (<1,000 bbl) and moderate for large spills ($\geq 1,000$ bbl), depending on the location, duration, size, and time of the spill. Although unexpected, a CDE spill, if one were to occur, may affect air

quality over a larger area, given burning and other spill-response measures, including possibly affecting air quality in planning areas adjacent to the one where the spill occurs. However, effects are expected to be moderate, given the relatively short duration of deteriorated air quality.

Acoustic Environment

Routine operations in the GOM and Alaska OCS planning areas could affect ambient noise conditions, with increases in noise levels expected to result in minor to moderate impacts to ambient noise levels. Noise-generating activities associated with routine operations include seismic surveys, drilling and production, infrastructure placement and removal, and vessel and aircraft traffic. Depending on the source and activity, increases in ambient noise levels could be short-term and localized (e.g., from vessel traffic), short-term and less localized (from seismic surveys), or long-term and localized (from production). Oil spills (including a CDE) could result in temporary minor to moderate impacts to the acoustic environment associated with noise generated by spill-response activities, including spill-response vessels and aircraft. Effects of sound on marine biota are considered in the respective resource areas.

Marine and Coastal Habitats

Coastal and Estuarine Habitats. Under any of the action alternatives, coastal and estuarine habitats could incur minor to moderate, localized impacts from routine operations such as pipeline and landfall construction, maintenance dredging of inlets and channels, and vessel traffic. Coastal and estuarine habitats could be disturbed by activities such as pipeline trenching and onshore facility construction. Shoreline habitats may also be affected by wake-induced erosion during routine dredging activities or ship traffic. Habitats potentially affected would include coastal dunes, wetlands, and barrier islands. The magnitude of these impacts would depend on the location of the construction activities, the level of dredging or shipping activity in a specific area, and existing environmental conditions (such as ongoing shoreline degradation).

Coastal and estuarine habitats could be affected by accidental oil spills and incur minor to major impacts. The magnitude of potential impacts to coastal and estuarine habitats would depend on a variety of factors, including the location, size, timing, and duration of the spill; the effectiveness of remediation efforts; existing environmental conditions (e.g., vegetation, substrate type, ice cover); and natural localized erosion and deposition patterns. The effects of small spills would generally be localized and relatively short-term and are anticipated to be negligible to moderate for small spills (<1,000 bbl) that occur offshore. In the event of a large spill (≥ 1000 bbl) or a CDE, habitats over a much greater geographic area may be affected and may incur more severe impacts where oil is concentrated or remobilized after burial. Large spills could result in moderate to major impacts to marine and coastal habitats, whereas a CDE could result in major impacts, depending on the location, duration, and timing of the spills; the habitats exposed to the spill; and the effectiveness of cleanup activities. In some cases, habitats such as coastal wetlands may not fully recover even following remediation.

Marine Benthic Habitats. Moderate impacts from routine OCS oil and gas activities could result from the construction and removal of infrastructure (wells, platforms, and pipelines), vessel traffic, and from authorized operational discharges (e.g., drilling muds and cuttings). Construction activities that involve the physical disturbance of the seafloor will result in moderate impacts to benthic habitats within and immediately adjacent to the disturbance footprint. In most cases, disturbed soft-bottom habitats would recover. Protective measures, currently required at the lease sale phase through lease stipulations, exist for seafloor habitats such as live bottom and pinnacle trend areas in the GOM (see Section 4.4.6.2.1, Marine Benthic Habitats – Gulf of Mexico, for a description of lease sale stipulations). These measures are expected to help reduce potential impacts on both nearshore and deeper water habitats.

Small and large accidental oil spills could affect benthic habitats and result in minor to moderate impacts to affected habitats. The magnitude of these impacts would depend upon the location, size, timing and duration of the spill; weather conditions; effectiveness of containment and cleanup operations; and other environmental conditions at the time of the spill. Impacts from small spills would be mostly localized and of short duration, and negligible for most small spills. If a large spill were to occur at the seafloor (i.e., from a wellhead or a pipeline), a greater variety and amount of habitat could be affected and incur minor to moderate impacts over a longer period of time. Although unexpected, a CDE may adversely affect benthic habitats over larger areas for long durations depending on the oil spill plume dynamics and dispersion, and result in moderate impacts. As a consequence, full recovery of oiled habitats could take many years in some locations.

Marine Pelagic Habitats. Overall, no long-term degradation of pelagic habitat is anticipated from the proposed action, and effects would be negligible to minor in the GOM and Alaska planning areas. During routine operations (including routine discharges), marine pelagic habitats could be affected as a result of increased turbidity associated with bottom-disturbing activities, and from operational discharges such as produced water and drilling muds and cuttings. Impacts would be largely localized and short-term in duration.

Small accidental spills may be expected to result in negligible (for spills <50 bbl) to minor (for spills up to 1,000 bbl) localized impacts on pelagic habitats. The effects from oil spills would depend on the location, magnitude, duration, and timing of the spill, on environmental factors (e.g., presence of sea ice, storms, ocean currents), and on the range and sensitivity of the habitats affected by the spill. A large spill or a CDE could reduce habitat quality over a larger area and result in minor to moderate impacts to affected habitats before oil is degraded. In the GOM, oil contacting *Sargassum* mats could result in complete or partial short-term loss of these unique habitats in some areas and cause substantial, but localized impacts on associated biota. In Alaska, accidental spills occurring under ice cover or in sea ice habitats could result in potentially long-term impacts to pelagic habitats.

Marine and Terrestrial Mammals

Impacts to marine mammals from routine operations include noise disturbance from seismic surveys, vessels, helicopters, construction and operation of platforms, and removal of

platforms with explosives; potential collision with vessels; and exposures to discharges and wastes. Impacts to cetaceans could range from negligible to moderate, with species or stocks inhabiting continental shelf or shelf slope waters most likely to be affected. Meeting the requirements of the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA), which is accomplished at the lease sale and/or plan stage, would reduce the likelihood and magnitude of adverse impacts from routine operations to most marine mammal species. For terrestrial mammals, no impacts are expected from routine operations in the GOM to endangered beach mice subspecies or the Florida salt marsh vole. In Alaska, impacts to terrestrial mammals from routine OCS operations would be negligible to moderate, with local, population-level effects possible for some species (i.e., muskoxen).

Accidental oil spills may result in the direct and indirect exposures of mammals and their habitats to the oil. Fouling of fur of some species (e.g., sea otter, polar bear, and fur seal) could affect thermoregulation and reduce survival, while ingestion of oil and oil-contaminated food could have acute and chronic effects. The magnitude of effects from accidental spills would depend on the location, magnitude, duration, timing, and volume of the spills; the habitats affected by the spills (e.g., marine and coastal habitats); and the species exposed. Spills in open waters may be expected to affect the fewest number of individuals. Very large spills, such as a CDE, could affect the greatest number of species and individuals, and have the greatest potential for adversely affecting local mammal populations. In Alaska, the greatest risk to marine mammals would be associated with large spills ($\geq 1,000$ bbl) reaching rookeries and haulout locations where large numbers of individuals could be exposed and population-level impacts on some species could occur. Overall, small spills would affect relatively few individuals and have negligible to minor impacts to marine and terrestrial mammals. Large spills could affect many more species, with minor to major impacts to marine and terrestrial mammals. Very large spills, such as an unexpected CDE, could result in local population-level effects.

Marine and Coastal Birds

Routine operations may result in negligible to moderate, localized, short-term impacts. Impacts would be associated primarily with infrastructure construction and ship and helicopter traffic. The primary effect would be the behavioral disturbance of birds in the immediate vicinity of the activity. In most cases, disturbed birds would temporarily leave the area, while in other cases, the displacement could be longer-term. Because many birds tend to habituate to human activities and noise, potential impacts from disturbance may be short-term and not expected to result in population-level effects. However, construction activities near coastal habitats could disrupt breeding and nesting activities of colonial nesting birds. Depending on the species, the numbers of birds affected, and the activity disturbed (nesting, molting, feeding, and staging), the displacement of disturbed birds could reduce reproductive success, foraging success, and survival. Some collision mortality with offshore platforms would be expected. Many avian species are attracted to platform lights whereby collisions ensue. This risk is increased in bad weather situations. Loss or alteration of preferred habitat due to pipeline landfalls or other onshore construction could result in the localized displacement and possible localized decrease of nesting activities.

Accidental oil spills pose the greatest threat to marine and coastal birds. Small spills could have negligible (for spills <50 bbl) to minor (for spills up to 1,000 bbl) impacts, while large spills ($\geq 1,000$ bbl) could result in moderate to major impacts to marine and coastal birds. An unexpected CDE could result in local population-level effects to unique bird species or concentrated populations in rare habitat areas. The magnitude and ecological importance of any effects would depend upon the size, location, duration, and timing of the spill; the species and life stages of the exposed birds; and the size of the local bird population. Exposure to spills in deep water would be largely limited to pelagic birds. Shallow-water spills that reach coastal habitats could affect the greatest variety and number of birds, including shorebirds, waterfowl, wading birds, gulls, and terns. Spills reaching onshore locations have the greatest potential for affecting the greatest number of birds, especially if a spill occurs in or reaches an area where birds have congregated and are carrying out important activities (such as nesting, molting, and staging areas for some of the Alaskan waterfowl and shorebirds). Exposed birds may experience a variety of lethal or sublethal effects, and the magnitude and ecological importance of any such effects would depend upon the size and location of the spill, the species and life stage of the exposed birds, and the size of the local bird population.

Fish Resources and Essential Fish Habitat

Overall, impacts to fish or essential fish habitat (EFH) from routine Program activities are expected to range from negligible to minor for fish and up to moderate for EFH, and no impacts on threatened or endangered fish species are expected. The primary potential impacts from routine Program activities could result from noise-generating and bottom-disturbing activities such as vessel traffic, seismic surveys, drilling, platform placement and mooring, and pipeline trenching and placement, which could displace, injure, or kill fish or disturb EFH in the vicinity of the activity. Fixed platforms, particularly the large numbers projected for the GOM, would also serve as artificial reefs that would attract substantial numbers of fish. Oil and gas activities would be temporary, and no permanent or population-level impacts on fish are expected. Displaced fish and invertebrate food sources would repopulate the area over a short period of time in the GOM, but fish habitat recovery may be longer-term in the Alaska OCS waters. The effects of drilling muds and produced water discharge would be localized, and no population-level effects are expected. When fixed oil and gas platforms are removed during the decommissioning phase, both explosive and non-explosive methods may be used to sever conductors and pilings. Non-explosive removals (e.g., abrasive, mechanical, or diver cutters) are expected to temporarily displace resident fish communities, but have little overall impact to the fish resources or EFH. Explosive platform removals may occur in the GOM potentially resulting in injury, mortality, and displacement for a large number of fish.

Small spills may have negligible (for spills <50 bbl) to minor (for spills up to 1,000 bbl) impacts on fish or EFH. Small spills would be localized and are unlikely to affect a substantial number of fish before dilution and weathering would reduce concentrations of toxic fractions to nontoxic levels. Large spills ($\geq 1,000$ bbl) could result in minor to moderate impacts to fish and EFH; such spills would affect a wider area (as a consequence, likely more fish species and individuals), with the magnitude of the impacts depending on the location, timing, and volume of spills, distribution and ecology of affected fish species, and other environmental factors. An

unexpected CDE could result in moderate impacts to fish and moderate to major impacts to EFH, depending on the nature of exposure, sensitivity of habitat, and effectiveness of spill response. Most adult fish are highly mobile and would likely avoid lethal hydrocarbon exposures, although they may be subjected to sublethal concentrations. Smaller species and egg and larval life stages are more likely to suffer lethal or sublethal exposures from oil contact because of their relative lack of mobility. Under most circumstances, any single large spill would affect only a small proportion of a given fish population; therefore, overall population levels may not be affected. However, fish species that currently have depressed populations or have critical spawning grounds present in the affected area could experience population-level impacts. Oil contacting shoreline areas used for spawning or providing habitat for early life stages of fish could result in large-scale lethal and long-term sublethal effects on fish. In Alaskan waters, where oil may be slow to break down, coastal oiling could measurably depress some fish populations for several years. However, no chronic impacts on fish populations are expected from small or large spills.

Reptiles

Five species of sea turtles occur in the three GOM planning areas: green, hawksbill, Kemp's ridley, leatherback, and loggerhead, and all are listed as threatened or endangered under the ESA. All but the hawksbill have been reported to nest on beaches within the GOM planning areas. In addition to these turtles, the American crocodile, which is federally endangered, occurs in the Eastern GOM Planning Area along the southern coast of Florida. Routine operations in the GOM are not expected to affect the American crocodile. This species could be affected in the event there is a very large oil spill that reaches the southern Florida coast, although that is unlikely even if such a spill were to occur. In such an event, adults and young could be directly exposed, and nest sites could be fouled. No reptiles occur in the Alaska OCS Planning Areas.

Impacts to reptiles from routine operations are expected to range from minor to moderate. Sea turtles could be directly affected by seismic surveys, vessel traffic, construction of offshore and onshore facilities, operational discharges, and removal of platforms. Noise generated during exploration and production activities and platform removal may result in the temporary disturbance of some individuals, while some turtles may be killed during the use of underwater explosives for platform removal. The construction and operation of new onshore facilities may impact nest sites, possibly result in eggs being crushed, and disturb hatchling movement from the nest sites to the water. Sea turtles may also be injured or killed by collisions with OCS vessels. Permit requirements, ESA regulations and requirements, regulatory stipulations, and BOEM guidelines could limit the seriousness of any potential effects on sea turtles. Therefore, while routine operations could affect individual sea turtles, population-level impacts are not expected.

Oil spills may expose one or more sea turtle life stages to oil or its weathering products. Oil reaching nests may reduce egg hatching and hatchling survival and inhibit hatchling access to water. Exposed hatchlings, juveniles, and adults may incur a variety of lethal or sublethal effects. The presence of oil on nesting beaches may affect nest site access and use. Small spills are unlikely to affect a large number of sea turtles or their habitats, and thus are not expected to have substantial or long-term effects. Small spills may have negligible (for spills <50 bbl) to minor (for spills up to 1,000 bbl) impacts, with relatively few individuals or habitats being

affected. Large spills could affect more species, individuals, and habitats, and result in moderate impacts to affected species. The magnitude of effects from accidental spills would depend on the location, timing, duration, and volume of the spills; the environmental settings of the spills; and the species and life stages of sea turtle exposed to the spills. A CDE, although unexpected, could affect the greatest number of individuals, life stages, and habitats and result in major impacts to the affected species. A very large spill could affect sensitive habitats, including nesting beaches, and potentially lead to population-level effects.

Invertebrates

Routine operations could result in negligible to moderate impacts to invertebrates, especially to benthic invertebrates. The primary impacts of routine Program activities would be from bottom-disturbing activities during the exploration and site development phases. Routine operations involving bottom disturbance (including pipeline trenching) could displace, bury, injure, or kill invertebrates in the immediate vicinity of the activities. Affected invertebrate communities would generally repopulate the disturbed areas over a short period of time (especially soft-bottom communities), although a return to the pre-disturbance community may take longer, particularly in the Arctic. If discharged into open water, the effects of drilling muds and produced water on invertebrates would be localized, and no population-level effects are expected. No long-term or population-level impacts on invertebrates are expected from routine operations following lease sales under any of the action alternatives.

Small surface or subsurface oil spills (<1,000 bbl and especially <50 bbl) would be rapidly diluted and likely result in negligible to minor, localized impacts on invertebrates. Large spills (\geq 1,000 bbl) would affect a larger number of benthic and pelagic invertebrates and their habitats, and could result in minor to moderate impacts to the affected biota and habitats. The location, size, duration, and timing of the spill would be important determinants of the impact magnitude of large spills. Impacts of a CDE could range up to moderate. Although unexpected, a CDE contacting shoreline areas with sensitive intertidal and shallow subtidal habitats could result in large-scale and long-term sublethal and lethal effects to the benthic communities in those habitats. In Alaska, local populations of intertidal organisms affected by such large spills could be measurably depressed for several years and oil could persist in shoreline sediments for decades.

Areas of Special Concern

Impacts to Areas of Special Concern (AOCs) resulting from routine Program activities are expected to be negligible to moderate because of the existing protections and use restrictions. Routine operations that could affect AOCs (e.g., National Marine Sanctuaries, National Parks) include the placement of structures, pipeline landfalls, operational discharges, and vessel traffic. However, direct impacts from these activities are unlikely, as no infrastructure (e.g., pipeline landfalls, shore bases) would be sited in National Parks, National Wildlife Refuges (NWRs), or other AOCs. In Alaska, no OCS-related activities would occur in National Park lands, thereby minimizing the potential for impacts from routine operations to these AOCs, and impacts from

routine activities in adjacent areas would be minimal. However, offshore construction of pipelines and platforms could have temporary effects on wildlife due to noise and activity levels and on scenic values for park visitors.

Small spills could have negligible (for spills <50 bbl) to minor (for spills up to 1,000 bbl) impacts on AOCs, while large spills ($\geq 1,000$ bbl) could have minor to moderate impacts on AOCs in the vicinity of the spill. Although unexpected, a CDE could have moderate impacts on AOCs related to direct oil contact or indirect spill response activities. The magnitude of the potential impact would depend on the location, size, duration, and timing of a spill; the weather conditions at the time of the spill; the nature and effectiveness of response operations; and other environmental conditions (e.g., presence of sea ice) at the time of the spill. Accidental oil spills reaching AOCs could negatively affect fauna and habitats, subsistence use, commercial or recreational fisheries, recreation and tourism, and other uses.

Impacts on Population, Employment, and Regional Income

The main effect on population and employment that could result from leasing will be the employment generated by routine Program activities. In the GOM, direct expenditures associated with routine operations would result in negligible impacts from small increases in population, employment, and income over the duration of the leasing period, corresponding to less than 1% of the baseline. In Alaska, direct expenditures would result in minor impacts from small increases in population, employment, and income in each region over the duration of the leasing period, corresponding to an increase of less than 5% of the baseline. Given existing levels of leasing activity, impacts on property values in the GOM and Alaska planning areas would be negligible. Small spills would have negligible (for spills <50 bbl) to minor (for spills up to 1,000 bbl) impacts, while impacts of larger accidental oil spills (and especially a very large but low-probability CDE) could range from minor to moderate, and could result in the short-term loss of employment, income, and property values. Expenditures associated with potential spill-response and cleanup activities would create short-term employment and income in some parts of the affected coastal region(s).

Land Use and Infrastructure

Routine Program activities would result in negligible to minor impacts in the GOM and negligible to moderate impacts in Alaska, on land use, development patterns, and infrastructure. In the GOM, existing infrastructure generally would be sufficient to handle exploration and development associated with potential new leases. In Alaska, additional infrastructure would be necessary to support Program development. Projected impacts in both the GOM and Alaska from an accidental oil spill (especially from a low-probability CDE) would alter land use temporarily, but would not likely result in long-term changes. The magnitude of the impacts would depend upon the location, size, timing, and duration of the spill and the existing land use at the spill location. Impacts from small spills may range from negligible (for spills <50 bbl) to minor (for spills up to 1,000 bbl), and minor for large spills ($\geq 1,000$ bbl) in all planning areas. Although unexpected, a CDE in the GOM could result in minor to moderate impacts to land use

and infrastructure, primarily due to the existing infrastructure already in place to address such an event. A CDE in the Cook Inlet Planning Area could have moderate impacts to land use and existing infrastructure, again primarily owing to the presence of existing infrastructure in place in some areas to address such an event. Impacts in the Cook Inlet Planning Area would likely be greater than in the GOM planning areas. Impacts of a CDE in the Arctic could range from moderate to major because of the limited existing infrastructure present for addressing such events and the need to mobilize substantial resources in a short period of time into an otherwise remote area.

Commercial and Recreational Fisheries

Routine operations could have minor impacts on commercial and recreational fisheries. Impacts would be associated primarily with vessel traffic and structure placement, presence, and removal, each of which could temporarily displace fishes away from the area and limit fishing success. However, these impacts would be temporary, and population-level effects on commercial and recreational fishery resources are not anticipated from these routine operations. Once platforms are installed and production activities begin, offshore structures would act as fish attraction devices for both pelagic and reef-associated species; these structures would also be attractive for recreational fishing. Seismic surveys and construction of platforms and pipelines could result in space-use conflicts with commercial and recreational fishing activities, although these effects would be localized. Space-use conflicts, in the case of seismic surveys, would be short in duration.

The level of effects from accidental oil spills on subsistence, commercial, and recreational fisheries would depend on the location, timing, duration, and volume of spills, in addition to other environmental factors. Small spills (up to 1,000 bbl and especially those <50 bbl) would have negligible to minor impacts, and would be unlikely to have a large effect before dilution and weathering reduces concentrations and, therefore, would not have long-term effects on subsistence, commercial and recreational fisheries. Impacts from large spills ($\geq 1,000$ bbl) and from CDE-level spills could range from minor to moderate, with impacts from CDE spills affecting a much larger area and potentially more resources, but over a limited period of time. If large oil spills were to occur, commercial, and recreational fisheries could be affected. The potential for oil-soaked fishing gear and potentially contaminated fish may reduce commercial and recreational fishing efforts and affect subsistence use of the resource. Very large spills could also indirectly affect fisheries by degrading habitats that are critical for the survival of target species, but would only be serious if they led to severe declines in target species populations. Highly mobile fish species (tunas, sharks, and billfish) could move away from surface oil spills in deep water, disrupting fishing efforts.

Tourism and Recreation

Routine operations would have minor, short-term negative effects on recreation and tourism, with potential adverse aesthetic impacts on beach recreation and sightseeing and potential positive impacts on diving and recreational fishing in the GOM coast. In Alaska,

routine operations would have minor, short-term, adverse effects on sightseeing, boating, fishing, and hiking activities in the Cook Inlet area; and sightseeing, hiking, and boating activities in the Chukchi Sea and Beaufort Sea Planning Areas.

Potential impacts on recreation and tourism resulting from an oil spill in any of the planning areas would likely include direct impacts (e.g., oil contamination of a beach), access restrictions to a particular area (e.g., no diving or fishing while cleanup is being conducted), and aesthetic impacts. These impacts could persist for several months or more pending cleanup completion and any required habitat restoration. The extent and duration of impacts, which could range from negligible (for spills <50 bbl) to moderate for large spills ($\geq 1,000$ bbl) and up to major for a CDE, would depend on the location, size, duration, and timing of the spill and on the effectiveness of response operations. Since oiled coastal sediments are often removed via mechanical means, such shoreline activity would effectively close the area to public use for the duration of cleanup operations. If restoration is required (i.e., to restore the proper beach profile), additional time may be required before public access is allowed. Historical evidence pertinent to the effects of major oil spills has indicated that spills may prompt either a seasonal decline in tourist visits and/or tourist movement to other coastal areas in the region. Impacts of a CDE would be expected to be most widespread and longest lasting.

Sociocultural Systems and Environmental Justice

Impacts of routine operations on sociocultural systems and environmental justice vary across OCS regions. In the GOM, where sociocultural systems have a long experience with offshore oil and gas operations, impacts on sociocultural systems would be few and impacts would be minor. The greatest impacts of routine operations on sociocultural systems in the GOM are expected to result from the ongoing expansion of oil and gas activities in the GOM, especially in expansion to deepwater and ultra-deepwater areas. This expansion of oil and gas activities has contributed to the cultural heterogeneity of the area by drawing the offshore workforce from a wider geographic range. Expansion to deepwater and ultra-deepwater areas has resulted in the creation of jobs that require more specialized skills and in requiring longer, unbroken periods of work offshore. While there is onshore oil development in the vicinity of Prudhoe Bay as well as in portions of Cook Inlet, there is currently no OCS oil and gas development in the Arctic. Thus, impacts to sociocultural systems from routine operations in the Alaska OCS Planning Areas may be minor for the Cook Inlet Planning Area and range from minor to moderate for the Arctic OCS Planning Areas. Of greatest concern to the Alaska Natives who inhabit the area are threats to their subsistence base and way of life. Noise from seismic surveys and exploratory drilling has the potential to deflect whales and other marine mammals from their accustomed migration routes and potentially make them more difficult to harvest.

A large environmental justice concern is the potential health risk to residents from nearby OCS-related infrastructure, including helipads, heliports, waste management facilities, pipe coating yards, shipyards, platform fabrication yards, supply bases, natural gas storage facilities, repair yards, refineries, port facilities, and terminals. In the GOM, with existing industrial infrastructure, routine Program operations are not expected to substantially change the health risk

exposure of nearby residents, and impacts are expected to be negligible. Environmental justice impacts from routine Program activities in the Cook Inlet and Arctic Planning Areas are expected to be minor.

The importance of marine mammals (such as the bowhead whale) to subsistence by Alaska Natives (especially in the Arctic) raises particular concerns with regards to oil spills. Any adverse environmental impacts on fish and mammal subsistence resources from accidental oil spills would have sociocultural impacts (primarily associated with disruption of subsistence activities) and could have disproportionately higher health or environmental impacts on Alaska Native populations. Impacts from small spills (<1,000 bbl) would range from negligible (for spills <50 bbl) to minor (for spills up to 1,000 bbl) in the GOM planning areas, primarily as a result of localized impacts to subsistence resources. Similarly, impacts from very small spills (<50 bbl) in the Alaska OCS Planning Areas would likely have negligible impacts on subsistence resources, especially if the spills occurred well off shore, while small spills up to 1,000 bbl could result in minor to moderate localized impacts to subsistence activities if concentrated in subsistence whaling areas. Effects of large spills ($\geq 1,000$ bbl) could be moderate to major in the GOM and Cook Inlet Planning Areas and major in the Arctic Planning Areas. The potential for greater impact in the Arctic primarily results from disturbance of or conflict with subsistence activities. Although unexpected, in the event of a CDE, impacts to sociocultural systems would be moderate to major in the GOM planning areas and major in the Cook Inlet and Arctic Planning Areas, especially if oil were initially trapped in ice and persisted over several open-water seasons in whaling areas. An oil spill (especially a large spill or CDE) that contacts subsistence resources could also have disproportionately high impacts on the Alaska Native population, if the subsistence resources were diminished or tainted as a result of the spill.

Archaeological Resources

Archaeological resources that could be affected by the proposed action include historic shipwrecks and inundated prehistoric sites offshore and historic and prehistoric sites onshore. Although shipwrecks tend to concentrate in shallow, nearshore waters in all OCS regions, historic shipwrecks are scattered across the entire continental shelf, and many are found even in deepwater areas. Inundated prehistoric sites may occur on those portions of the continental shelf that were exposed as dry land during the period of lower sea levels of the last ice age. The extent of the continental shelf that was exposed varies from area to area; however, globally, sea levels were approximately 120 m (394 ft) lower than present approximately 21,000 to 19,000 years ago. Onshore historic properties include sites, structures, and objects such as historic buildings, forts, lighthouses, homesteads, cemeteries, and battlefields. Onshore prehistoric archaeological resources include sites, structures, and objects such as shell middens, earth middens, campsites, kill sites, tool manufacturing areas, ceremonial complexes, and earthworks.

Routine operations associated with the proposed action that may affect archaeological resources in all regions include drilling wells, installing platforms, installing pipelines, anchoring, and constructing onshore infrastructure. Impacts may range from negligible to major, depending on the significance and uniqueness of the affected resources and the number of resources affected. Existing Federal, State and local laws and regulations require that

archaeological surveys be conducted prior to permitting any activity (onshore or offshore) that might disturb a significant archaeological site. Compliance with existing laws and regulations should protect archaeological resources to the maximum extent possible from most impacts associated with routine activities; however, it is still possible that some impacts could occur.

Should direct physical contact between a routine activity and a shipwreck site occur, it could destroy fragile ship remains and/or disturb the site context and result in major impacts associated with a loss of data on ship construction, cargo, and the social organization of the vessel's crew, as well as the concomitant loss of information on maritime culture for the time period from which the ship dates. Ferromagnetic debris associated with OCS operations could mask the magnetic signature of historic archaeological resources, making them difficult to detect with magnetometers. Interaction between a routine activity and a prehistoric archaeological site could destroy artifacts or site features and could disturb the stratigraphic context of the site.

Oil spills could affect coastal historic and prehistoric archaeological resources and could also result in minor to major impacts associated with the unavoidable loss of information and physical damage of oiled artifacts and sites. The level of this impact would depend on the significance and uniqueness of the information lost. Archaeological resource protection during an oil spill requires specific knowledge of the resource's location, condition, nature, and extent prior to impact; however, the coastal areas of the various OCS regions have not been systematically surveyed for sites. Existing information indicates that prehistoric sites in all regions occur frequently along the mainland coast and barrier islands and along the margins of estuaries, bays, and lagoons; thus, any spill that contacts these areas could involve a potential impact on a prehistoric site.

Alternative 8 – No Action

The evaluation of a No Action Alternative is required by the regulations implementing NEPA (40 CFR 1502.14(d)). If the Secretary were to adopt this alternative, it would halt OCS pre-sale planning, sales and new leasing from 2012 to 2017, even in the Central and Western GOM Planning Areas. However, exploration, development, and production operations stemming from past sales would continue and may possibly occur relatively sooner than may otherwise occur, given a no new sale decision.

This alternative would eliminate new leasing from mid-2012 through mid-2017, but affect OCS operations for up to 40–50 years. The amounts of OCS natural gas (up to 35 trillion cubic feet) and oil (up to 8.1 billion barrels of oil) that could help meet national energy needs would be forgone. That amount of energy would have to be replaced by a combination of imports, alternative energy sources, and conservation.

Market forces are expected to be the most important determinant of the substitute mix for OCS oil and gas. Key market substitutes for forgone OCS oil production would be imported oil, conservation, switching to gas, and onshore production. For OCS natural gas, the principal substitutes would be switching to oil, onshore production, imports, and conservation. This contributes to a greater potential for major effects in different OCS Planning Areas from oil

spills from increased tankering. As a partial replacement for the forgone natural gas, increased reliance on coal, nuclear, hydroelectric, or wind-generated electric power is also expected. Other types of major impacts can occur with development of these energy substitutes to OCS oil and gas. For example, as in international offshore oil and gas extraction, catastrophic accidents can occur upstream in the energy chain. In other cases, there is potential for catastrophic accidents in downstream activities such as domestic power production (i.e., nuclear accident).

In addition to market-based substitutes, the nation or individual States might choose to encourage or even impose programs designed to deal with the energy shortfall. To replace oil, these programs might favor alternative vehicle fuels such as ethanol or methanol, vehicles with greater fuel efficiency, or alternate transportation methods such as mass transit. The government may give more emphasis to programs encouraging more efficient electricity transmission and more efficient use of gas and electricity in factories, offices, and home. Conservation and reduced demand are not expected to make up a substantial fraction of the energy demand or foregone OCS oil and gas production.

Conclusions

This PEIS is consistent with the requirements of the OCSLA (43 USC 1331 *et seq.*), NEPA (42 USC 4321), and CEQ regulations for implementing NEPA (40 CFR Part 1500). Scoping for preparation of the Draft PEIS and public commenting on the Draft PEIS were used to obtain input from stakeholders, including individuals, public interest organizations, and governmental agencies. This input was used to develop the alternatives and issues analyzed in this PEIS.

On the basis of the analyses in this PEIS, the types of impacts that could occur during routine Program activities would be similar among the action alternatives. The alternatives differ principally on the basis of where the impacts could occur and to what extent, which is directly related to the planning areas included in each alternative. Routine operations are expected to result in impacts that range from negligible to major, with most being short-term and recovering following completion of the routine activities. Accidental spills may also result in impacts that range from negligible to major depending on the nature of the spill and spill response. Although unexpected, the greatest effects would occur with a low-probability CDE, but the nature and magnitude of impacts would vary substantially and depend on the location, size, duration, and timing of the spill, the resources affected, and the effectiveness of the spill containment and cleanup activities.

The USDOJ's procedures for implementing NEPA provide for adaptive strategies that allow for the refinement of an action during implementation, where appropriate (43 CFR 46.415). BOEM's process for implementing a 5-year Program through the various OCSLA stages represents an opportunity for adaptive management and more detailed treatment of both longstanding and developing concerns. The Secretary's decision to address size, timing, and location of potential lease sales is the initial step in a multi-year, deliberate process; the actual Program is subsequently materialized through numerous subsequent decisions on lease

sales, geological and geophysical permits, exploration and development plans, and, ultimately, decommissioning plans.

BOEM is committing to several process enhancements to ensure effective tiering and make decisions more transparent during the phased OCSLA and tiered NEPA processes of this Program. Although specific approaches to implementation may be tailored to the different needs of the regions and their stakeholders, BOEM is determined to improve the process by:

- Committing to implementing an **alternative and mitigation tracking table** to track the receipt and treatment of alternative and mitigation suggestions starting with those received during preparation of the 5-year Program.
- Committing to **strengthening the pre-lease sale process** by taking a number of steps to enhance opportunities for members of the public to comment and provide new information in the pre-lease sale planning process.
- Committing to preparing an **annual progress report** of the 5-year Program voluntarily, expanding the requirement of Section 18(e) of the OCSLA.
- Committing to **systematic planning** opportunities that foster improved governmental coordination, communication, and information sharing.

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