OCS Study
BOEM 2012-003

Inventory of Environmental and Social Resource Categories Along the U.S. Coast

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1. Introduction

In the aftermath of the *Deepwater Horizon* oil spill in April 2010, the Bureau of Ocean Energy Management (BOEM) is making consideration of the potential impacts of low-probability/high-consequence events more explicit in its assessments of future exploration, development, and production activities on the Outer Continental Shelf (OCS), including analyses conducted in its development of the new Five Year Program for 2012-2017. A decision as to whether or not to proceed with proposed lease sales (auctions) necessarily carries with it the risk, however slight, of catastrophic discharge events (CDE), regardless of the decision. This stand-alone paper, which grew out of Appendix B of the Proposed Program decision document (November 2011), addresses environmental and social resources and activities that could be affected by a CDE resulting from OCS oil and natural gas activities anticipated from proposed lease sales. While it addresses the resources and activities that could be affected by a catastrophic event from tanker imports, it does not do so for activities necessary to obtain other energy substitutes to replace the foregone OCS oil and natural gas, such as onshore oil and natural gas, coal, hydropower or nuclear power.

In addition to the risk of a CDE, OCS oil and natural gas activities also carry the risks of "reasonably foreseeable" environmental and social costs. The same is true for the activities necessary to provide substitutes for OCS oil and natural gas under the Five Year Program, should the No Sale Option be selected for one or more program areas.[1] While this document can help in an understanding of these reasonably foreseeable costs, its focus is on CDEs. More detailed analyses of reasonably foreseeable program and energy substitute costs can be found in *Forecasting Environmental and Social Externalities Associated with OCS Oil and Gas Development: The Revised Offshore Environmental Cost Model (OECM)* (BOEM 2012-025).

As described below, a "catastrophic" event is not expected and would be considered well outside the normal range of probability despite the inherent risks of oil production-related activities. Recently implemented safeguards including additional subsea BOP testing, required second downhole mechanical barriers, well containment systems and additional regulatory oversight make such an event even less likely. However, a CDE is still possible, and the interaction of a range of physical and human factors means that the same initial discharge event could cause very different impact trajectories. Therefore, it is difficult to predict what the impacts of future events would be other than to say they could be large in terms of human, economic, and environmental impacts. The potential for "catastrophe" is not solely a function of the quantity of oil released, as the uncontrolled release of X barrels at a particular location at a particular time of year could have more significant economic or environmental effects than a release of $10X$ barrels under different circumstances. Wherever possible, BOEM is interested in understanding the potential costs to society in quantitative or monetary terms, recognizing that the type and scale of actual costs would be highly dependent upon the circumstances of the event and its aftermath, and that the full scope of effects to the wellbeing of communities and the environment is difficult to quantify in monetary terms. Recognizing that the scope of effects on these resources could vary greatly based on the magnitude of the event, describing these features in their totality provides a holistic look at potentially affected assets.

[1] A program area is a planning area, or a portion thereof, considered for future leasing in the Five Year Program.

This document primarily describes resources and activities that could be affected by CDEs.[2] A complementary analysis in the second part of *Economic Analysis Methodology for the Five Year OCS Oil and Gas Leasing Program for 2012-2017* (BOEM 2012-022) presents the results of an initial attempt to quantify possible costs of hypothetical CDEs, using the very sparse set of available data. The analyses in the Programmatic Environmental Impact Statement (EIS) also provide additional information and data on possible risks from a potential CDE.

The actual cost of a specific CDE would depend on the extent to which it affects nearby resources and activities. While it is extremely unlikely that even a CDE would destroy all, or even most, of the value of the resources and activities described, the information in this document allows the reader to think about the different kinds of effects that might occur in or near one program area relative to those that might occur in or near another. Further, any estimation of costs must necessarily be from a national or a regional perspective. From a national perspective, if the total value of recreational visits (whether measured in contributions to local economies or consumer surplus) remained the same but merely shifted from one location to another, there would be no net cost. From a regional perspective, the full cost or benefit would be attributed to each of the affected areas. Likewise, from a national perspective funds paid for cleanup are costs, because the money otherwise would have been spent on productive activities elsewhere in the national economy. However, from a regional perspective, some of the financial costs of a CDE may be offset by the inflow of funds for containment and cleanup activities (e.g., to companies and individuals owning fishing boats) and compensation payments. A thorough estimate of possible costs from a CDE from a regional perspective would include consideration of such factors and include only the plausible costs for each hypothetical CDE scenario. Because the primary purpose of this document is to provide a description of the most important resources and activities that could be affected along various portions of the coast and not to estimate possible costs of a potential CDE, it largely ignores offsetting effects of revenue inflows, possible movement of recreational or commercial activities from one portion of the coast to another, and other such factors that should be considered in a true estimation of potential costs, and it describes the full inventory of resources and activities, rather than the subset likely to be at risk from specific CDE scenarios.

2. Description of a Catastrophic Discharge Event

A CDE is any high-volume release of oil into the marine environment with long-term effects, regardless of its cause (e.g., a hurricane, human error, terrorism). The analyses performed in development of the Proposed Final Program (PFP) decision document and EIS focus on low-probability, hypothetical CDEs resulting from well blowouts that cannot be contained for months. The National Oil and Hazardous Substances Pollution Contingency Plan further defines such a catastrophic event as a "spill of national significance," or one that "due to its severity, size, location, actual or potential impact on the public health and welfare or the environment, or

[2] Resources and activities are presented for each program area and the adjacent coastal areas. The effects of a CDE, could extend beyond this area and, in the case of a spill of imported oil due to a tanker accident, the source of the oil could be outside the program area, for example, near port or even along another coast, given that imports would not have to be shipped to the area where the OCS oil would have been produced. However, the segmentation of areas in this document makes it easier for the reader to distinguish which resources and activities are most important in which parts of the Gulf and its coastal areas.

the necessary response effort, is so complex that it requires extraordinary coordination of federal, state, local, and responsible party resources to contain and clean up the discharge" (40 CFR 300, Appendix E).

This assessment of the potential value of resources and activities that could be impacted by a CDE does not mean that a catastrophic event is expected or likely. Consistent with the programmatic analysis for the EIS and statistical analysis of offshore drilling history in both the U.S. OCS and international waters, a catastrophic blowout event is very unlikely in any program area, especially in light of the greatly improved regulations and industry safeguards that have been implemented since the *Deepwater Horizon* explosion and oil spill. These improvements not only address the factors that contribute to a possible loss of well control, but they improve the likelihood that any such accident would be controlled quickly and the oil contained or removed before it could spread to sensitive resources.

2.1 OCS Catastrophic Event Spill Sizes

For consideration of potential environmental and social costs, BOEM's specifications regarding the magnitude of catastrophic events by program area are taken from the Programmatic EIS. CDE size ranges were developed for each program area, taking into account considerations such as water depth, weather conditions (such as ice cover), potential flow rate, and the potential availability of response equipment for drilling relief wells. For GOM program areas, CDE volumes range from 900,000 to 7,200,000 barrels (bbl), depending on the depth at which the loss of well control occurs. For the Cook Inlet program area, CDE volume estimates range from 75,000 to 125,000 bbl, depending on the availability of a rig to drill a relief well. For the Chukchi Sea and Beaufort Sea program areas, CDE volume estimates range from 1,400,000 to 2,100,000 bbl and 1,700,000 to 3,900,000 bbl, respectively. For these Arctic CDE estimates, the range in volumes depends on the timing of the CDE relative to the ice-free (open water) season and the availability of a rig to drill a relief well. These estimates assume an unmitigated flow rate until a relief well is drilled and do not account for use of response assets including a capping stack.

2.2 Large Tanker Spill Sizes

The alternative to production from a new Five Year Program, i.e., conducting no lease sales for at least the relevant five-year period, is increased consumption of substitute energy sources, such as increased imports of foreign oil. Therefore, BOEM is considering the resources and activities that could potentially be impacted by a low probability/high consequence tanker spill from tankers that would be delivering foreign oil to U.S. ports to replace foregone OCS oil production as well as from tankers that would be delivering oil produced under the program to U.S. ports.[3] **Table 1** provides a general profile of such tankers.

[3] See explanation of estimated market substitutions for OCS production in Net Social Value section of part IV.C of the Proposed Final Program decision document. BOEM expects oil produced in the GOM to continue to be transported by pipeline to shore. However, in the High case, a small percentage of OCS oil would likely be transported by tanker. Oil produced on the Alaska OCS would be transported overland by pipeline and transported by tanker to West Coast markets.

Table 1: Profile of Tankers Transporting Imported Oil

Type	Deadweight Tonnage Range	Cargo Range (bbl)	Maximum Wing Tank Capacity (bbl)
Ultra large crude carrier	300,000 – 550,000	1,920,000 – 3,520,000	250,000
Very large crude carrier	200,000 – 320,000	1,280,000 – 2,048,000	137,000
Suezmax	120,000 – 180,000	768,000 – 1,152,000	96,000
Aframax	79,000 – 120,000	506,000 – 768,000	550,000
Small	55,000	352,000	25,000

Design features on double-hulled tankers generally ensure that no more than 50 percent of a tanker's total cargo volume could be lost under any reasonable "worst-case discharge" scenario, so a catastrophic event would involve an ultra large crude carrier (ULCC) tanker of 550,000 deadweight tonnage and a maximum cargo of 3.52 million barrels releasing up to 1.76 million barrels of its cargo. Even this value, which represents the likely worst-case tanker event, is at the low end of the CDE spill size ranges for OCS well blowouts given in the preceding section. The actual impact of the spill would depend on geographic area affected and distance from shore at which the tanker discharge occurs. For example, ultra-large crude carriers in the GOM offload at the Louisiana Offshore Oil Port (LOOP) or transfer oil to smaller tankers in the offshore lightering zones, so it would be highly unlikely that the spill would occur closer than 50 miles to shore. The largest event in the nearshore GOM would likely be a spill from an Aframax tanker headed towards the Houston Ship Channel after lightering in the Western or Central GOM. The maximum spill volume in that case would most likely be 384,000 barrels.[4]

3. Potential Impacts of a Catastrophic Event on Coastal Areas

In the broadest terms, a CDE in any of the program areas would have the potential for (1) direct impacts on physical and biological resources, (2) direct and indirect impacts on regional economic activities, many of which are dependent upon the health of these resources, and (3) direct impacts on the public's use and enjoyment of physical and biological resources. The EIS provides a broad analysis of these three impact categories in the context of a well blowout and CDE. This document supplements the analysis in the *Economic Analysis Methodology* paper (BOEM, 2012) and complements the EIS analysis by providing additional monetized estimates of resource categories that might be affected in the unlikely case of a CDE resulting from a program decision to lease or not to lease.

As described above, a CDE in this analysis is characterized by the release of a large volume of oil over a long period of time. However, the volume and duration of the release are only two of the factors that will influence the nature and severity of the event's impacts. Other factors that can influence a CDE's impact (or the ability to predict its impact) include, but are not limited to:

[4] A smaller spill close to shore could impose much higher costs than a larger spill occurring far offshore. Proximity to shore accounts for part of the much higher per-barrel cleanup and response costs for the close-to-shore Exxon Valdez (non-OCS) tanker spill relative to per-barrel costs for the *Deepwater Horizon* oil spill.

- For wellhead blowout events:
  - The size and complexity of the geologic reservoir and the pressure under which oil is contained in the reservoir.
  - The relative maturity of the production field since the dynamics of a more mature field are likely to be better understood than those of a field in a newer, "frontier" region.
  - The water depth at which the event occurs.
  - Performance of technology (proper performance vs. failure)
  - The human response to the event.

- For both wellhead blowout events and tanker spills:
  - The location of the event relative to the coastline.
  - The response infrastructure and capability at or in operational proximity to the event location.
  - The nature and extent of immediate containment actions at the source and thus the period over which the oil release is uncontrolled.
  - The nature and extent of response actions including booming, skimming, burning, or the use of dispersants as oil moves away from the event location.
  - The properties of the oil and the degree to which it evaporates or weathers under local environmental conditions.
  - The influence of prevailing winds or ocean currents on oil in the water.
  - The season in which the event occurs.

This analysis focuses on the resources and activities that might be affected by a CDE rather than on specific scenarios that account for each of these variables and the impacts and costs that might result from each.

Because economic values and regional economic activity measure different things, they should be viewed as providing complementary, yet different, perspectives on the economic implications of a spill. As noted above, a catastrophic event would have the potential for (1) direct impacts on physical and biological resources, (2) direct and indirect impacts on regional economic activities, and (3) direct impacts on the public's use of coastal resources. This analysis attempts to develop reasonable estimates of the value of these resources and activities to help frame the discussion of the potential cost of a hypothetical CDE. In applying the estimated value of resources and activities presented in this paper to any estimate of spill costs, the following should be noted.

- The economic cost of a CDE is the value of the resources used or destroyed as a result of the spill. The economic spill cost may differ from the amount of compensation paid by responsible parties to those affected. Compensable damage is dependent upon particular legal statutes in place in the affected countries and may or may not include all aspects of the economic cost of a spill.
- According to standard economic theory, the economic cost of a good, service or productive resource is determined by what society is willing to sacrifice in order to acquire it. If the good or service is traded in properly functioning competitive markets, its price is representative of its opportunity cost and provides a reasonable and convenient approximation of its value to society. However, many services and

amenities provided by the natural environment are not traded in markets and do not have a market price. Where market prices are non-existent it becomes necessary to assess the cost of damages using other, somewhat less direct methods. This analysis considers both the direct, market-based components of the economic cost and the value of damages to natural resources not exchanged in markets.

- When describing the potential impacts associated with a catastrophic event, it is important to distinguish between changes in economic *value* and changes in regional economic *activity*. Value, more specifically net economic value or consumer surplus, is measured by what individuals are *willing to pay* for something above and beyond what they are required to spend. This concept of value is recognized as the appropriate measure to compare the costs and benefits of policy alternatives and measure damages resulting from injury to natural resources.[5] Alternatively, economic activity reflects commercial revenues, employment, tax receipts, *et cetera,* and is generally driven by consumer expenditures.

3.1 Potential Effects on Physical and Biological Resources

In all program areas, each phase of a catastrophic blowout event has the potential to result in adverse impacts to coastal or marine habitats and wildlife.

- During the initial event, a blowout could disturb a large amount of sediment if it occurs outside the wellbore, below the seafloor.
- During the offshore spill phase, oil in the pelagic zone or at the surface could result in population-level impacts to offshore biological resources, including federal- and state-listed threatened and endangered species. In addition, natural processes, such as flocculation, and human intervention, such as the use of dispersants, could expose benthic communities to oil. Bottom-disturbing response activities, such as vessel anchoring could also have an adverse impact on benthic communities.
- During the onshore contact period, potential impacts to biological resources would expand to coastal species and degradation of sensitive coastal habitats could occur, even if mitigated by response actions such as the use of booms and skimmers. Any resulting loss of vegetation could lead to erosion and permanent land loss.
- Over the longer term, habitat loss or impairment caused by exposure to oil could result in additional adverse changes in biological populations by disrupting the elements required for successful reproduction. The chronic effects of sub-lethal exposure to oil could result in losses that exceed mortality due to oiling, if these residual effects influence a significant proportion of a population or disproportionately affect an important population segment.

The impact on physical and biological resources resulting from a tanker spill of imported oil would largely be the same as those resulting from a blowout. The exception would be that the potential for acute and chronic effects on biological organisms in the water column, and not on the ocean surface, would be reduced.

[5] For example, see U.S. Environmental Protection Agency's *Guidelines for Preparing Economic Analyses* (2010) and U.S. Department of the Interior Natural Resource Damage Assessment Regulations (43 CFR Part 11).

Measuring the impact of a catastrophic blowout event or tanker spill in monetary terms in the context of natural resource damage assessment is increasingly dependent on the use of "equivalency analyses" such as habitat equivalency analysis (HEA) or resource equivalency analysis (REA), rather than efforts to try to estimate social welfare values for natural resources for which there is no "market price" such as through stated preference techniques that estimate consumer surplus through the creation of hypothetical markets.[6] In general, equivalency analyses determine the necessary scale of actions such as habitat restoration that would deliver a quantity of natural resource services equal to the "residual" impact, or the reduction in services over time, attributable to the event after taking into account response and cleanup activities. Once these analyses are completed, and one or more restoration actions have been identified and scaled to the loss, the actions' implementation costs become the monetary measure of the event's impact. The magnitude of these costs can vary considerably based on their location, scale, and complexity.

The HEA method has been supported by the courts and is listed explicitly as an acceptable method for quantifying ecological service losses in the DOI regulations.[7] When data are available, HEA can be a time and cost-effective method for service loss quantification. As a result, it is the most widely applied approach to service loss quantification in natural resource damage assessments.

3.2 Potential Effects on Economic Activity

While measures of changes in social welfare or consumer surplus are appropriate in the context of cost-benefit analyses and assessments of natural resource damages, the alternative and more commonly cited way of considering the impact of a catastrophic blowout or tanker spill event is to assess its effect on regional economic activity in terms of jobs, labor income, and value added. In many (not all) coastal areas, regional economies tend to be dominated by tourism and recreation, commercial fishing, commercial shipping, and oil and natural gas production. Though not explored here in detail, the economic context in which a CDE occurs could have an effect on the short-term or long-term impact. For example, during a recession or other period of low economic growth, workers who lose their jobs as a direct or indirect result of a CDE may have difficulty finding new employment, thereby increasing the severity of the economic effect. On the other hand, some workers and/or owners in some businesses, such as commercial fishing, are likely to be hired to assist with containment/cleanup efforts or to house cleanup workers. Summary level information on the industries that a CDE would affect most significantly is as follows.

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[6] For a brief explanation of habitat equivalency analysis, and resource equivalency analysis, see *Forecasting Environmental and Social Externalities Associated with OCS Oil and Gas Development: The Revised Offshore Environmental Cost Model (OECM)* (BOEM 2012-025)at www.boem.gov.

[7] For example, in the case of United States v. Great Lakes Dredge and Dock Company, HEA was used to scale damages associated with lost sea bottom habitat in the Florida Keys National Marine Sanctuary to restoration projects proposed as compensation. The U.S. Court of Appeals for the 11th Circuit, upheld the decision that reliance on HEA for scaling ecological losses to restoration was appropriate in this case (U.S. v. Great Lakes Dredge & Dock Co., 259 F.3d 1300 (11th Cir. 2001)).

Tourism and Recreation: Prior to oil from a catastrophic blowout event or tanker spill reaching shore or migrating some distance away from the source, water dependent tourism and recreation activities could be affected in the vicinity of the spill. Effects such as reduced participation and thus reduced economic activity also could be observed during the early stages of an event due to perceived or anticipated changes in the availability or quality of ocean and coastal resources. As the event continues over an extended period of time and as oil spreads over a larger area or comes into contact with coastal resources, the impact on industries supported by tourism and recreation would become more widespread, particularly if the event occurred during the summer season. Employment for spill-cleanup operations would provide temporary business for hotels, caterers, and similar businesses, but the income and employment would not always accrue to the same businesses and employees who suffered from the negative effect on normal tourism and recreation activities. The scale of the impact on the tourism and recreation sector could be significant given the size and importance of this sector to many coastal areas, particularly in the coterminous United States. Additionally, the scope and scale of the impact of a CDE over the longer term would further depend both on the speed and success of cleanup activities and on the time required for the public to regain confidence that tourism and recreation-related amenities have returned to their pre-event condition.

Commercial Fishing: Similar to recreational fishing, the commercial fishing sector could be disrupted by a catastrophic blowout event or tanker spill in or near the program areas, if state and federal waters were closed to fishing over a period that could extend to several months after the event. The impact of the spill would depend on the season in which it occurred and the location of areas subject to closure, since commercial fisheries have both spatial and temporal characteristics. However, as with other sectors, the potential for impact is large if fishers do not have the ability to move from closed to open areas in an economically rational manner, without experiencing a significant change in net revenues due to greater fuel and other costs associated with harvesting in a less preferred location. Over the longer term, after cleanup and other response actions are complete, this sector also may be susceptible to a slower-than-expected return to baseline market conditions if consumers perceive continuing issues with the quality or safety of seafood products. As outlined in the sections that follow, the commercial fishing industry generates income and value added measured in the billions of dollars on an annual basis. A CDE that caused significant disruption to commercial fishing for part of a year may therefore result in substantial regional economic impacts. However, depending on the species, as well as how much oil was released and what happened to it, a fishing ban resulting from a CDE may lead to an increase in fish stocks, partially mitigating adverse impacts for the commercial fishing sector.

Commercial Shipping and Transport: A CDE has the potential to disrupt commercial shipping of domestic and international freight as well as passenger transportation within the marine transportation system. In particular, a significant and persistent oil spill could cause delays in vessel movement, and economic losses, resulting from the need to decontaminate vessels prior to their entry into a port.

Oil and Natural Gas: In the aftermath of a catastrophic blowout event and less likely in the aftermath of a tanker spill, a suspension of at least some offshore oil and natural gas activities would be likely to allow for review and possible additional revision of safety and operating

procedures. In addition, the pace at which new exploration activities are permitted might decrease for some period of time. If either outcome applied to a large area or continued for more than a few months, the regional economic effect could be pronounced, as it would have an effect on a wide range of firms that provide materials and services throughout the oil and natural gas value chain. In the extremely unlikely case of more than one such event in the same area, attitude changes could lead to long-term or permanent loss of some economic activities. Employment for spill-cleanup operations would provide temporary employment to some workers but not necessarily for those affected by the slower pace of oil and natural gas exploration, development, and production. The potential scale of this impact is indicated by measures of the oil and natural gas sector's size in individual program areas.

3.3 Potential Effects on Public Use

Coastal areas offer numerous opportunities for the public's use and enjoyment of coastal and marine resources. These include beach use, hunting, wildlife viewing, and other recreational activities, particularly in state- and federally-managed parklands, and recreational fishing. A catastrophic blowout event or tanker spill would result in a decrease in the number of trips taken by the public for the purpose of engaging in one or more of these activities, whether due to the imposition of use restrictions, or simply the public's perception of the quality and availability of natural amenities in the event's aftermath. If a CDE were to occur during, or just prior to, the peak coastal use season, the number of foregone trips for public use would be particularly high. Additional information on public uses of coastal and marine resources and a discussion of the potential impact of a CDE on these uses is presented below.

Beach Activity: Beach use represents a major component of the public's use of coastal resources. When oil from a catastrophic blowout event or tanker spill reaches the shoreline, the use of oiled coastal beaches would be restricted or prohibited at least until the completion of cleanup activities. Beach use might decline also due to perceptions and concerns about the quality of the beach environment even at locations where the oil does not come in contact with the shore. The magnitude of the impact will be a function of factors such as the length of oiled beach, the season(s) in which prohibitions or restrictions on beach use are in place, the effectiveness of cleanup or other response activities, and public perceptions of the extent to which beaches and shoreline waters have been affected. Changes in recreational use are commonly assessed as a change in social welfare or consumer surplus based on economic studies that estimate the value the public places on an activity such as a trip to the beach.

Parks Visitation: Coastal communities in the program areas are also home to several state- and federally-owned National Parks, National Seashores, and National Wildlife Refuges (NWR). In addition to visiting beaches in these parks, the public visits these areas for numerous other activities, such as hiking, hunting, and wildlife viewing. As with beach use, a catastrophic blowout event or tanker spill has the potential to cause the closure of one or more of these areas for an extended period of time, resulting in a reduction in the number of trips, and economic losses determined by the value that members of the public place on a single trip, which may vary within and between program areas.

Recreational Fishing: Recreational fishing, both from shore and by boat, is a major public use of coastal natural resources that would also be disrupted by a catastrophic spill event. If the event were to occur immediately prior to or during the peak summer fishing season, the impact, as measured by the number of foregone trips, would be substantial. In economic terms, the impact could be measured as a change in social welfare by valuing each of the foregone trips based on consumer surplus values similar those used for other recreational activities. Alternatively, it may be appropriate to consider the impact in terms of recreational fishing's contribution to the regional economy. If a CDE were to prevent or otherwise limit the scale of recreational fishing activity for some part of a calendar year, the monetary impact in regional economic terms could be substantial.

Subsistence Use: While not a recreational use, subsistence fishing and harvesting is an important public use of coastal and marine resources across all program areas. Oil released during a CDE may contaminate large portions of the coastal and marine environment, making it impossible to subsist on the resources available in this environment for an extended period of time.

4. The Central Gulf of Mexico[8]

Expanding upon the description of catastrophic event impacts presented in the previous section, this section details the specific resources and activities that could be affected by catastrophic events in and near the Central GOM program area.[9] Consistent with the discussion above, the description in this section focuses on physical and biological resources in the Central GOM and adjacent coastal area, as well as economic activity and public uses of coastal and marine resources in the area. For each of these categories, the potentially affected resources and activities are documented and, based on this information, the potential implications of a CDE in or near the Central GOM can be compared with those in or near other program areas. The resources that would be affected, to what extent, and for how long could vary considerably, depending on how much oil is released and how much of it reaches shore (and in what locations).

While the discussion in this section largely focuses on resources potentially affected by a CDE in and near the Central GOM program area, it is important to note that oil displacing Central GOM oil under the No Sale Option could affect other areas. Thus, there is a tradeoff between potential impacts associated with program-related production in the Central GOM and impacts associated with oil from other sources. For example, in the absence of program production in the Central GOM, oil imports to the East Coast or to other parts of the GOM may increase, potentially affecting resources in these areas.

[8] A small portion of Alabama's coast abuts the Eastern Gulf of Mexico Planning Area while the remainder is along the Central GOM Planning Area. For the purposes of this document, all data for Alabama are included in the Central GOM discussion.

[9] The risks extend beyond the program area, so the data and descriptions in this section go beyond the program area boundaries as well. In the case of tankers bringing oil in place of OCS oil that would be foregone in the case of a No Sale decision, the catastrophic event itself could occur outside the program area.

4.1 Physical and Biological Resources in the Central Gulf of Mexico and the Nearby Coastal Zone

The GOM coastal area contains four broad natural ecosystems, all of which could be adversely affected by a catastrophic spill or blowout event – terrestrial, freshwater, estuarine and marine/continental shelf.[10] These systems support a wide array of plants, animals, and natural habitats, including rich sediments, barrier islands, seagrass beds, pitcher plant bogs, and wet pine savannas. The coasts of Mississippi, Alabama, and Louisiana contain some of the highest rates of biodiversity in the United States (Gulf Coast Ecosystem Restoration Task Force, 2011). The ocean ecosystems of the Central GOM provide a variety of services to the region. These ecological services include "provisioning services" such as food, water, timber, and fiber; "regulating services," which can affect climate, floods, disease, wastes, and water quality; and "supporting services" such as soil formation, photosynthesis, and nutrient cycling. Ecosystems in the area also support "cultural services" that provide recreational, aesthetic, and spiritual benefits (Millennium Ecosystem Assessment, 2005).

Table 2 provides an overview of the total acreage for different ecosystem types in Louisiana. More than one-third of Louisiana's coastline is made up of open estuarine water; another third is composed of swamp wetlands, open fresh water, and fresh water marshes. Louisiana has the largest expanse of coastal wetlands in the continental United States and is home to the largest delta in North America (Gulf Coast Ecosystem Restoration Task Force, 2011).

Table 2: Total Acreage for Each Ecosystem Type in Louisiana, 2007

Land Cover Type	Acres
Fresh Water Marsh	877,099
Intermediate Marsh	660,933
Brackish Marsh	547,445
Saline Marsh	421,561
Shrub-scrub wetland	172,106
Forested/Swamp Wetland	1,031,561
Open Fresh Water	99,2127
Open Estuarine Water	3,549,990
Upland Shrub-Scrub	84,799
Upland Forest	172,106
Pasture-Agriculture	481,575
Total	8,940,461
Source: Batker et al., 2010.	

[10] Of these four systems, only the last (marine/continental shelf) is technically within the range of the program area. A CDE related to exploration and development in the program area could nonetheless affect resources on or near the coast.

4.2 Economic Activity in the Central Gulf of Mexico and the Nearby Coastal Zone

4.2.1 Commercial Fishing

The commercial fishing industry represents a major source of jobs and income in the Central GOM. In 2009, the seafood industry in the Central GOM generated total revenues of more than $2.3 billion. This sum comprised $391 million in sales in Alabama, $1.7 billion in Louisiana, and $289 million in Mississippi. **Table 3** presents an economic summary of the seafood industry across the entire Central GOM area, including impacts on jobs, sales, income, and total value added (National Oceanic and Atmospheric Administration (NOAA), 2009a). As indicated in the exhibit, the seafood industry supports almost 30,000 jobs in Louisiana, nearly 8,800 jobs in Alabama, and almost 6,400 jobs in Mississippi. In addition, the total "value added" of the seafood industry represents approximately 0.12 percent of state Gross Domestic Product (GDP) in Alabama, 0.39 percent in Louisiana, and 0.16 percent in Mississippi (based on state GDP data from Bureau of Economic Analysis (BEA), 2011).

Table 3: Economic Impacts of the Central GOM Seafood Industry, 2009

Impacts	Jobs	Sales (million$)	Income (million$)	Value Added (million$)
ALABMA				
Commercial Harvesters	1,378	66.9	19.8	29.5
Seafood Processors & Dealers	1,656	165.2	41.2	52.3
Importers	126	34.7	5.56	10.6
Seafood Wholesalers & Distributors	132	6.25	2.19	2.8
Retail Sectors	5,468	178.3	79.6	101.5
Total Impacts	**8,759**	**391.3**	**148.4**	**196.8**
LOUISIANA				
Commercial Harvesters	10,587	534.7	177.3	262.4
Seafood Processors & Dealers	1,794	152.1	59.0	75.2
Importers	1,264	347.6	55.7	106.0
Seafood Wholesalers & Distributors	944	103.5	35.2	45.7
Retail Sectors	14,597	553.1	246.9	313.9
Total Impacts	**29,185**	**1,691.0**	**574.2**	**803.1**
MISSISSIPPI				
Commercial Harvesters	1,238	60.9	18.8	27.3
Seafood Processors & Dealers	1,046	78.9	31.2	39.1
Importers	50	31.7	2.19	4.16
Seafood Wholesalers & Distributors	112	10.5	3.69	4.65
Retail Sectors	3,946	125.4	56.7	71.3
Total Impacts	**6,392**	**289.2**	**112.6**	**146.5**
Source: NOAA, 2009a.				

As suggested by the data in **Table 3**, a catastrophic event that limited seafood production in the Central GOM area would not only affect fisherman, but would also impact seafood processors and others in the seafood value chain. The magnitude of a catastrophic event's impact on the

seafood industry would depend on the timing and geographic scope of the spill and the ability of fisherman to increase harvests from unaffected waters.

4.2.2 Tourism and Recreation

To highlight the economic significance of a decline in tourism that may result from a catastrophic event in the Central GOM, **Table 4** presents an overview of the economic scale of the tourism and recreation industries in this region. These data describe both the "ocean" and "coastal" economies of each state in the Central GOM coastal area as derived from county level data. "Ocean" economy data are limited to industries and activities in the "tourism and recreation" sector that are defined as being ocean-dependent. "Coastal" economy data comprise all industries and activities in the "leisure and hospitality" sector in counties that are adjacent, in whole or in part, to the GOM shoreline. The exhibit includes data that are available for each state within the Central GOM area for 2009; industries lacking data from 2009 were not included.

Table 4: Measures of the Central GOM Coast Tourism and Recreation Sector, 2009

Industry	Establishments	Employment[2]	Wages (million$)	GDP (million$)
Ocean Economy Data				
ALABAMA				
Amusement and Recreation Services NEC[1]	26	153	$2.90	$8.55
Boat Dealers	24	177	$5.45	$11.9
Eating & Drinking Places	521	8,651	$117.1	$231.2
Hotels & Lodging Places	76	1,731	$33.1	$70.4
Marinas	16	125	$3.78	$6.03
LOUISIANA				
Boat Dealers	27	218	$9.07	$20.8
Eating & Drinking Places	1,185	21,483	$350.4	$694.2
Hotels & Lodging Places	190	6,326	$170.8	$437.6
Marinas	19	98	$2.65	$5.09
MISSISSIPPI				
Boat Dealers	15	70	$2.21	$5.48
Eating & Drinking Places	577	9,623	$127.0	$267.0
Hotels & Lodging Places	86	1,246	$19.7	$39.5
Recreational Vehicle Parks & Campsites	16	117	$2.77	$5.55
Coastal Economy Data (Shore-adjacent Counties)				
Alabama	1,335	25,340	$368.4	$711.0
Louisiana	4,424	82,240	$1,809.7	$3,880.0
Mississippi	844	25,852	$545.4	$1,192.1

Source: National Ocean Economics Program (NOEP), 2012a; NOEP, 2012b.
Notes:
1. NEC – Not Elsewhere Classified
2. NOEP defines **e**stablishments as places of work. Employment is measured by the location of an establishment, not the firm, as there are many firms that have multiple establishments.

In total, the tourism and recreation sector, as measured as part of the ocean economy, accounts for 0.20 percent of Alabama's state GDP, 0.57 percent of Louisiana's GDP, and 0.34 percent of Mississippi's economy (based on state GDP data from BEA, 2011). When expanded to include the entire coastal counties, the leisure and hospitality sector accounts for 0.43 percent of Alabama's GDP, 1.9 percent of Louisiana's, and 1.3 percent of Mississippi's, a slightly larger percentage across the board. Louisiana, with significantly more coastline and more coastal population centers than the other two states, relies more heavily on tourism than Alabama or Mississippi.

4.2.3 Commercial Shipping and Transport

A catastrophic spill or blowout event has the potential to significantly disrupt the commercial shipping of domestic and international freight, as well as passenger transportation, within the Central GOM marine transportation system. In particular, a significant and persistent oil spill could cause delays in vessel movement and economic loss associated with the decontamination of vessels prior to their entry into a port.

Table 5: Top 10 Ports in the U.S. and Top Central GOM Ports by Total Traffic, 2009

U.S. Rank	PORT[1]	All Directions (m short tons)	Receipts[2] (m short tons)	Shipments[2] (m short tons)	Intraport[2] (m short tons)
1	Port of South Louisiana	212.6	106.3	102.0	4.28
2	Houston, TX	211.3	113.1	83.7	14.5
3	New York, NY and NJ	144.7	78.3	46.1	20.3
4	Long Beach, CA	72.5	48.7	23.7	0.87
5	Corpus Christi, TX	69.2	44.2	22.0	2.06
6	New Orleans, LA	68.1	34.4	31.3	37.1
7	Beaumont, TX	67.7	45.3	20.5	1.94
8	Huntington-Tristate, WV	59.1	20.9	34.1	4.24
9	Los Angeles, CA	58.4	35.7	21.9	0.77
10	Texas City, TX	52.6	37.6	14.5	0.45
11	Lake Charles, LA	52.2	35.4	15.9	0.92
12	Mobile, AL	52.2	25.1	26.6	0.50
13	Baton Rouge, LA	51.9	22.1	28.2	1.63
14	Port of Plaquemines, LA	50.9	24.7	26.1	0.06
…					
16	Port of Pascagoula, MS	36.6	22.9	13.7	0.03

Notes
1. Ports shaded gray are located in the Central GOM.
2. "Receipts" represent imports, "Shipments" represent exports, and "Intraport" represents traffic within a given port.

The magnitude of impacts on commercial shipping depend on the characteristics of the spill or blowout, local conditions at the time of the event, and the volume of shipments shipped through affected ports. For shipping volumes, 7 of the 20 largest U.S. ports, as measured by the amount of cargo flowing through the ports on an annual basis, are located along the Central GOM (U.S. Army Corps of Engineers (USACE), 2009). A significant disruption could hinder or halt the

amount of traffic moving in and out of any or all of these ports. **Table 5** presents the total domestic (trade between the contiguous 48 states, Alaska, and Hawaii) and foreign (trade between the United States and all foreign countries and territories) commodity traffic at these ports for 2009 and, for perspective, for the top 10 largest U.S. ports. In 2009, the total waterborne traffic of the United States was 2.2 billion short tons, including both domestic and foreign traffic. Together the Central GOM ports listed in **Table 5** made up 24 percent of that sum (USACE, 2009).

4.2.4 Oil and Natural Gas Production

Oil and natural gas production in the Central GOM is a significant component of the regional economy. The oil and natural gas sector makes up approximately 6.4 percent of Louisiana GDP and 0.5 percent of state GDP in Alabama (based on state GDP data from BEA, 2011).[11] In addition, as indicated in **Table 6,** the industry directly employs nearly 20,000 people in the Central GOM (excluding those employed in Mississippi).

The data in **Table 6** reflect only the *direct* impacts of the oil and gas industry in the Central GOM states, but oil and natural gas production in the area also results in indirect and induced economic impacts.[12] Data on these impacts specific to the Central GOM are not readily available, but a 2010 study by IHS Global Insight estimates the indirect and induced effects of oil and natural gas production for the entire Gulf of Mexico (IHS Global Insight, 2010). Allocating these effects to the individual GOM program areas in proportion to their offshore oil and natural gas production in 2011, we estimate that the indirect and induced economic impacts of oil and natural gas production in the Central GOM include employment impacts of 238,000 jobs, wages of $11.9 billion, and GDP of $22 billion.

Table 6: Economic Impacts of Offshore Oil and Natural Gas Exploration and Production in the Central GOM

Year*	Establishments	Employment	Wages (million$)	GDP (million$)
Alabama	15	380	$30.3	$735
Louisiana	612	19,442	$1,737	$13,195
Mississippi	NO DATA AVAILABLE			

*The most recent year for which data are available is 2005 for Alabama and 2009 for Louisiana.
Source: NOEP, 2012a.
Note: NOEP defines **e**stablishments as places of work. Employment is measured by the location of an establishment, not the firm, as there are many firms that have multiple establishments.

[11] Data for the oil and gas exploration and production sector are based on four NAICS code industries (1997): Crude Petroleum and Natural Gas Extraction (211111), Drilling Oil and Gas Wells (213111), Support Activates for Oil and Gas Operations (213112), and Geophysical Exploration and Mapping Services (54360). Data on the oil and gas sector's contribution to state GDP in Mississippi were not readily available.

[12] The data in Table 6 are for the three states in closest proximity to the Central Gulf of Mexico program area. However, establishments located outside of these three states, most notably in Texas and Florida, also support oil and natural gas exploration and development in the Central GOM (see Tables 17 and 26, respectively, for information on Texas and Florida). Thus, the data in Table 6 may underestimate the economic activity in the oil and gas sector potentially affected by a CDE in the Central GOM program area. Similarly, many of the establishments reflected in Table 6 support offshore oil and gas exploration in other Gulf of Mexico program areas. A portion of the economic activity shown in Table 6 may therefore apply to other program areas.

Table 7 presents offshore oil and natural gas production data for the Central GOM for 2010 and 2011. As indicated in the table, the vast majority of offshore oil and natural gas production in the area occurs in federal rather than state waters. In addition, the offshore production in the Central GOM is more significant than in any other GOM planning area. The Central GOM accounts for approximately 85 to 90 percent of offshore GOM oil production and approximately 75 percent of GOM natural gas production.

Table 7: Central GOM Offshore Oil and Natural Gas Production, 2010-2011

	Oil (millions barrels)		Gas (million MCF)	
Year	2010	2011	2010	2011
TOTAL	**480.1**	**370.9**	**1,843.8**	**1,353.2**
Federal	473.5	364.8	1,673.4	1,353.2
State	6.63	6.14*	170.4	68.3*

Notes:
*Alabama data not yet available for 2011.
Mississippi state water production is negligible and not included here.
Sources: Federal OCS production data are from BOEM (2012). State production data for Louisiana are from the Louisiana Department of Natural Resources (undated), and data for Alabama are from Geological Survey of Alabama (undated).

4.3 Public Use in the Central Gulf of Mexico Coastal Zone

4.3.1 Coastal Recreation

The public makes extensive use of the coastal and marine resources in the Central GOM area for recreational purposes. Each year, members of the public take approximately 15 to 20 million trips to the beaches of Louisiana, Mississippi, and Alabama (Roach et al. 2001). The 2000 National Survey on Recreation and the Environment (NSRE) provides state-by-state participation data for all types of coastal recreation. **Table 8** presents the number of participants for each recreation activity in the Central GOM. Beach visitation in Mississippi and Alabama and saltwater fishing in Louisiana were the most popular activities, but wildlife-viewing and photography also drew a significant number of visitors across the entire Central GOM.

Table 8: Central GOM Coastal Recreation Participation, 2000

RECREATION ACTIVITY	CENTRAL GOM (millions of participants)			
	MISSISSIPPI	ALABAMA	LOUISIANA	TOTAL
Visit Beaches	1.042	1.249	0.629	2.92
Visit Waterside Besides Beaches	0.164	0.31	0.331	0.805
Swimming	0.563	1.022	0.398	1.983
Snorkeling	0.025	0.107	0.016	0.148
Scuba Diving	0.004	0.018	0.011	0.033
Surfing	0.00	0.045	0.009	0.054
Wind Surfing	0.008	0.027	0.008	0.043
Saltwater Fishing	0.312	0.615	0.975	1.902
Motorboating	0.228	0.272	0.671	1.171
Sailing	0.047	0.103	0.072	0.222
Personal Watercraft Use[1]	0.07	0.139	0.136	0.345
Canoeing	0.01	0.019	0.019	0.048
Kayaking	0.01	0.022	0.00	0.027
Rowing	0.00	0.013	0.015	0.028
Water-skiing	0.039	0.071	0.095	0.205
Bird Watching	0.317	0.351	0.387	1.055
Viewing Other Wildlife in Water-based Surroundings	0.235	0.364	0.385	0.984
Viewing or Photographing Scenery in Water-based Surroundings	0.427	0.441	0.596	1.464
Hunting Waterfowl	0.006	0.062	0.083	0.151
Any Coastal Activity[2]	**1.801**	**2.549**	**2.165**	**6.515**

Source: Leeworthy & Wiley, 2001.

[1] Personal watercraft use likely includes some other recreational categories in the table, such as canoeing and kayaking, but also includes the use of watercraft such as jet skis and wave runners.

[2] The total number of coastal activity participants is not the sum of the rows that precede it, because the categories do not account for double counting. For example, people who go to the beach and swim are counted under both activities.

The Central GOM's coastal zone is also home to a dozen National Wildlife Refuges (NWR) and numerous state parks. Visitation rates at NWRs in the GOM range from thousands per year at smaller units to tens of thousands per year at larger units. In 2006, the U.S. Fish and Wildlife Service (USFWS) estimated the per-day values the public placed on hunting and wildlife viewing. For the Central GOM states, these values ranged from a median of $28 to $32 for hunting and from $12 to $28 for wildlife viewing (USFWS, 2009). **Table 9** presents a list of NWRs located directly on the Central GOM coast. Others, such as Big Branch Marsh NWR in Louisiana, are slightly further inland, but could also be affected by a catastrophic event if visitors forego trips to the region due to real or perceived degradation of environmental quality along the coast.

Table 9: National Wildlife Refuges in Close Proximity to the Central GOM

Louisiana	Mississippi and Alabama
Lacassine NWR (LA)	Bogue Chitto NWR (MS)
Shell Keys NWR (LA)	Mississippi Sandhill Crane NWR (MS)
Bayou Teche NWR (LA)	Grand Bay NWR (MS/AL)
Delta NWR (LA)	Bon Secour NWR (AL)
Breton NWR (LA)	
Bayou NWR (LA)	

The Gulf Island National Seashore, in Mississippi and Alabama, saw more than 5.5 million visitors in 2011, almost all of whom were visiting for recreational purposes. **Table 10** presents visitation statistics and camping data for this National Seashore. As indicated in the table, visits to the National Seashore peak in the summer. Thus, a catastrophic event occurring in the late spring or summer would likely result in more significant recreational use impacts than events that occur at other times of the year.

Table 10: Gulf Islands National Seashore Visitation Statistics, 2011 (participants)

2011	Rec Visits	Non-Rec Visits	Tent Campers	RV Campers	Back Country Campers	Misc Campers	Total Overnight Stays
January	232,684	7,736	1,412	2,413	19	127	3,971
February	185,770	7,791	678	4,912	9	193	5,792
March	357,849	9,012	4,072	11,535	48	430	16,136
April	535,857	12,841	5,001	10,988	58	937	16,984
May	628,835	9,322	4,047	9,537	218	937	14,739
June	662,969	8,419	4,033	12,941	497	763	18,294
July	702,600	9,090	3,489	15,933	216	707	20,522
August	542,731	10,061	1,431	5,040	108	247	7,078
September	482,024	8,954	1,680	5,305	133	456	7,574
October	426,116	9,801	4,013	8,212	90	521	12,836
November	374,367	6,484	1,852	6,822	26	360	9,060
December	370,070	8,625	613	4,721	43	317	5,694
2011 Total	**5,501,872**	**108,136**	**32,321**	**98,359**	**1,465**	**5,995**	**138,680**

Source: National Park Service (NPS), 2012.

4.3.2 Recreational Fishing

Related to coastal recreation, recreational fishing represents a significant use of coastal and marine resources in the Central GOM. Residents of and visitors to the Central GOM areas took approximately 7 million recreational fishing trips in 2008 (Pritchard 2009). Based on information published by NOAA, a catastrophic event in the Central GOM could result in the closure of recreational fishing areas for a period of several months and cover an area as large as 40 percent of state and federal waters in the GOM at the closure's peak (NOAA, 2011).

Information on angler expenditures and their influence on the Central GOM economy may shed light on the economic impacts of potential reductions in recreational fishing that may result from

a catastrophic spill or blowout event. Angler expenditures provide income and employment in a variety of economic sectors. The effects of these expenditures can be classified as direct, indirect, or induced. Direct effects occur when anglers purchase goods at fishing retailers and other businesses. Indirect effects occur when those businesses pay operating expenditures and purchase supplies from wholesale trade businesses and manufacturers. Induced effects occur when employees in both the directly affected and indirectly affected sectors expend their income in the normal course of household consumption. The sum of the direct, indirect, and induced impacts represents the total economic contributions of recreational fishing expenditures to the overall economy of the Central GOM impact area (Gentner and Steinback, 2010).

Table 11 presents a summary of these impacts in the Central GOM, based on recreational fishing expenditures in 2006. The economic impacts of recreational fishing in the region are clearly focused in Louisiana. That state saw more than 70 percent of the Central GOM's recreational fishing expenditures and almost three quarters of the total jobs supported by direct, indirect, and induced impacts from those expenditures. Expenditures and impacts were of similar magnitude for Mississippi and Alabama.[13]

Table 11: Total Economic Impacts Generated from Marine Recreational Fishing Expenditures in and along the Central GOM, 2006

Impact Type	Expenditures	Direct Impact	Indirect Impact	Induced Impact	Total Impact
ALABAMA					
Output (million$)	$662.5	$384.4	$120.6	$125.1	$630.2
Value Added (million$)		$185.5	$65.2	$74.8	$325.5
Income (million$)		$128.0	$38.5	$40.1	$206.6
Employment (Jobs)		4,457	909	1,206	6,572
LOUISIANA					
Output (million$)	$2,852	$1,435.5	$459.7	$486.8	$2,382.0
Value Added (million$)		$674.7	$237.8	$286.8	$1,199.3
Income (million$)		$481.3	$145.2	$155.1	$781.7
Employment (Jobs)		18,012	3,718	4,881	26,612
MISSISSIPPI					
Output (million$)	$528	$327.0	$88.5	$75.0	$490.5
Value Added (million$)		$102.7	$44.4	$42.3	$189.5
Income (million$)		$75.5	$26.5	$21.7	$123.8
Employment (Jobs)		2,275	716	740	3,731

Source: Gentner & Steinback, 2008.
Note: Direct effects occur when anglers purchase goods at fishing retailers and other businesses. Indirect effects occur when those businesses pay operating expenditures and purchase supplies from wholesale trade businesses and manufacturers. Induced effects occur when employees in both the directly affected and indirectly affected sectors expend their income in the normal course of household consumption. The total Impact represents the sum of the direct, indirect, and induced impacts.

[13] Note that the economic impacts from recreational fishing presented here may overlap with some of the impacts of the commercial tourism and recreation sector described above, such as boat rentals. However, the extent of that overlap is not possible to determine given the available data.

4.3.3 Subsistence Use

Some communities and households in the Central GOM region rely on coastal natural resources, particularly fish and ducks, for basic subsistence. These subsistence uses go largely unrecorded, and systematic research has been virtually nonexistent, so valuing them accurately is extremely difficult (NOAA, 2006). Subsistence fishing and shrimping nevertheless represent an important public use of the GOM's coastal areas, particularly to rural communities. Dellenbarger, Schupp and Kanjilal (1993), in a summary of south Louisiana fishing households, indicate that 70 percent of these families reported fishing in order to obtain fish for family consumption. Kelso *et al.* (1991) report that almost 89 percent of Louisiana's freshwater anglers and 91 percent of its saltwater anglers stated that they eat at least some of the fish that they catch. Qualitative information regarding barter exists, but is very rare (Gramling *et al.*). Similar surveys do not appear to exist for Mississippi and Alabama, although observational data suggest that fishing communities rely on at least part of their harvests for basic subsistence (NOAA, 2006).

5. The Western Gulf of Mexico

This section highlights the biological, economic, and public use resources in and near the Western GOM program area that may be affected by a CDE. Although this discussion focuses on resources in and near the Western GOM, note that a CDE associated with oil displacing Western GOM oil under the No Sale Option could affect other areas. In other words, program decisions involve a tradeoff between potential impacts associated with program-related production in the Western GOM and impacts associated with oil obtained from other sources. For example, in the absence of program production in the Western GOM oil imports to the East Coast or to other parts of the GOM may increase, potentially affecting resources in these areas (i.e., if a tanker spill were to occur).

5.1 Physical and Biological Resources in the Western Gulf of Mexico and the Nearby Coastal Zone

A catastrophic event in the Western GOM would pose risks to the region's diverse physical and biological resources. The Texas coast contains 12 distinct ecoregions and wide biodiversity, with more than 457 species of fish and 343 species of invertebrates in estuarine and marine waters (Gulf Coast Ecosystem Restoration Task Force, 2011). Coastal marshes in the Western GOM provide habitats for more than one million migrating and wintering bird species and nursery areas for fish and shellfish. Texas' coastal wetlands account for 6 percent of total U.S. wetland acreage, and 12 percent of GOM wetlands (State of the Gulf of Mexico Summit, 2011). These wetlands reduce coastal erosion by providing a buffer against storm surge. Spilled oil that reaches shore could damage these habitats and adversely impact bird, fish, and shellfish species that they serve. To highlight some of the biological resources at risk in the region, **Table 12** presents a brief overview of the population status of major bird and fish species in Galveston Bay Estuary.

Table 12: Bird Species in Galveston Bay Estuary

BIRDS		
Feeding Guild	**Species**	**20-Year Population Trend**
Marsh Feeders	Great Blue Heron	Declining
	Reddish Egret	Declining
	Roseate Spoonbill	Stable
	Snowy Egret	Stable
	Tricolored Heron	Declining
Open-Water Feeders	White Ibis	Stable
	Black Skimmer	Declining
	Brown Pelican	Increasing
	Least Tern	Stable
	Royal Tern	Stable
	Sandwich Tern	Stable

FISH	
Species	**20-Year Population Trend**
Black Drum	Stable
Red Drum	Stable
Sand Seatrout	Stable
Southern Flounder	Stable
Spotted Seatrout	Stable

Source: EPA, 2007

Oyster reefs along the Texas coast are also important to the region's ecosystem and economy. These reefs supply habitat for other commercial and recreationally important finfish and shellfish species, improve water quality, reduce turbidity, and provide shoreline protection from erosion (Gulf Coast Ecosystem Restoration Task Force, 2011).

Seagrasses play a key role in the marine ecosystem of the Western GOM for commercially and recreationally important fish species (State of the Gulf of Mexico Summit, 2011). In addition to providing habitat for a fish and a variety of other wildlife, seagrass stabilizes the bottom, serves as a source of organic biomass for coastal food webs, and improves water quality. **Table 13** presents an overview of the acreage of sea grass along the Gulf Coast of Texas.

Table 13: Status and Trends in Texas Seagrass – Upper Coast, 1999

Bay System	Current Acreage	Percent of Coastwide	Species*	Trends
Galveston	280	0.1	Rup, (Hph, Hd, Th)	Gone (except Christmas Bay)
Matagorda East Matagorda	3,830	1.6	Hd, Rup, Hph	Possibly decreasing
San Antonio Espiritu Santo	10,600	4.6	Hd, Rup, Hph	Fluctuates with inflows
Copano	8,000	3.4	Hd, Rup	
St. Charles			Hd, Rup	
Aransas			All five	

Source: Texas Parks and Wildlife, 1999.
Acreage excludes freshwater submerged aquatic vegetation (SAV) in/near bay deltas.
*Hd = Halodule, Rup = Ruppia, Hph = Halophila, Th = Thalassia, Syr = Syringodium

5.2 Economic Activity in the Western Gulf of Mexico and the Nearby Coastal Zone

5.2.1 Commercial Fishing

As an indicator of the commercial fishing activity at risk to a catastrophic event in the Western GOM, the seafood industry in the region generated a total of approximately $1.7 billion in sales revenue and $470 million in income in 2009. **Table 14** presents a summary of the economic impacts of the seafood industry in the Western GOM, including impacts related to jobs, sales, income, and total value added (NOAA, 2009a). As indicated in the exhibit, the commercial seafood industry in the Western GOM supported almost 19,000 jobs in 2009. The total impact constituted approximately 0.06 percent of Texas' total GDP in 2009 (based on state GDP data from BEA, 2011).

Table 14: Economic Impacts of the Western GOM Seafood Industry, 2009

	Jobs	Sales (million$)	Income (million$)	Value Added (million$)
Commercial Harvesters	3,674	$318.5	$91.2	$146.8
Seafood Processors & Dealers	1,297	$107.3	$40.4	$53.1
Importers	2,494	$686.1	$110.0	$209.1
Seafood Wholesalers & Distributors	923	$123.3	$41.1	$57.0
Retail Sectors	10,486	$447.0	$191.1	$250.0
Total Impacts	**18,874**	**$1,682.1**	**$473.7**	**$716.1**
Source: NOAA, 2009a.				

5.2.2 Tourism and Recreation

A catastrophic blowout or spill event may adversely affect tourism in the Western GOM due to real or perceived degradation of the coastal environment. In 2009, tourism in the area directly supported approximately 33,000 jobs and $500 million in total wages. **Table 15** presents a breakdown of this sector by industry for 2008 and 2009. The data in the table describe both the ocean and coastal economies of the Western GOM as derived from county level data. "Ocean" economy data are limited to industries and activities in the "tourism and recreation" sector that are defined as being ocean-dependent. "Coastal" economy data comprise all industries and activities in the "leisure and hospitality" sector in counties that are adjacent, in whole or in part, to the GOM shoreline. Based on the ocean economy data in **Table 15**, restaurants, bars, and other eating and drinking establishments are the largest industry within the Western GOM tourism sector, comprising more than 1,300 establishments and 27,000 jobs in 2009, followed by hotels and lodging places, which supported more than 300 establishments and 5,000 jobs.

Table 15: Economic Impacts of the Western GOM Tourism & Recreation Sector, 2008-2009

Industry	Year	Establishments[2]	Employment	Wages (million$)	GDP (million$)
Ocean Economy Data					
Amusement and Recreation Services NEC[1]	2009	72	453	$6.67	$15.0
	2008	69	408	$6.63	$14.0
Boat Dealers	2009	40	300	$11.3	$24.6
	2008	42	316	$11.6	$25.7
Eating & Drinking Places	2009	1,356	27,107	$371.2	$764.8
	2008	1,391	27,578	$362.0	$771.9
Hotels & Lodging Places	2009	309	4,728	$87.4	$229.8
	2008	310	4,848	$88.4	$243.5
Recreational Vehicle Parks & Campsites	2009	32	132	$2.18	$5.73
	2008	29	120	$1.72	$4.74
Scenic Water Tours	2009	28	261	$4.49	$7.71
	2008	30	259	$4.27	$10.3
Coastal Economy Data (Shore-adjacent Counties)					
Texas	2009	11,899	258,646	$4,394.7	$8,367.0
	2008	11,633	256,572	$4,299.9	$8,902.5

Source: NOEP 2012a; NOEP 2012b.
Notes:
1. NEC – Not Elsewhere Classified
2. NOEP defines **e**stablishments as places of work. Employment is measured by the location of an establishment, not the firm, as there are many firms that have multiple establishments.

5.2.3 Commercial Shipping and Transport

As measured by the amount of cargo moving in and out of the ports on an annual basis, 4 of the 10 largest U.S. ports are located in the Western GOM alone. **Table 16** presents the total domestic and foreign commodity traffic at these ports for 2009. The Port of Houston was the second largest American port that year, with more than 200 million tons of goods flowing through the port. In some past years, Houston has surpassed the Port of Southern Louisiana as the largest port in the United States. Approximately 20 percent of U.S. commodity traffic in 2009 passed through the five Texas ports highlighted in **Table 16**. Given this high volume of traffic, a catastrophic spill or blowout event in the Western GOM that limited vessel traffic in and out of ports could cause significant disruptions to the regional economy. Goods and services would be delayed in reaching consumers and businesses, and exports from the region would be delayed in reaching their destinations.

Table 16: Top 10 Ports in the U.S. and Top Western GOM Ports by Total Traffic, 2009

U.S. Rank	PORT[1]	All Directions (m short tons)	Receipts[2] (m short tons)	Shipments[2] (m short tons)	Intraport[2] (m short tons)
1	Port of South Louisiana	212.6	106.3	102.0	4.28
2	Houston, TX	211.3	113.1	83.7	14.5
3	New York, NY and NJ	144.7	78.3	46.1	20.3
4	Long Beach, CA	72.5	48.7	23.7	0.87
5	Corpus Christi, TX	69.2	44.2	22.0	2.06
6	New Orleans, LA	68.1	34.4	31.3	37.1
7	Beaumont, TX	67.7	45.3	20.5	1.94
8	Huntington-Tristate, WV	59.1	20.9	34.1	4.24
9	Los Angeles, CA	58.4	35.7	21.9	0.77
10	Texas City, TX	52.6	37.6	14.5	0.45
…					
19	Port Arthur, TX	33.8	18.9	14.8	0.56

Note:
1. Ports shaded gray are located in the Western GOM.
2. "Receipts" represent imports, "Shipments" represent exports, and "Intraport" represents traffic within a given port.

5.2.4 Oil and Natural Gas Production

As described in Section 3, a catastrophic event may lead to a decline in offshore oil and natural gas production as authorities review safety and operational procedures to prevent similar events from occurring in the future. **Table 17** provides a breakdown of GDP, employment, and other economic statistics for the offshore oil and natural gas industry in Texas.[14,15] In 2009, the industry, which has seen significant growth over the past 5 years, supported 90,000 jobs, $13.2 billion in wages, and 5.3 percent of Texas' state GDP (based on state GDP data from BEA, 2011).

The data in **Table 17** reflect only the direct economic effects of offshore oil and natural gas production in the Western GOM. The exploration, development, and production of offshore oil and natural gas, however, also result in indirect and induced economic impacts in the area. Data on these impacts specific to the Western GOM are not readily available, but a 2010 study estimates the indirect and induced effects of oil and natural gas production for the entire GOM (IHS Global Insight, 2010). Allocating these effects to the individual GOM program areas in

[14] Data for the oil and gas exploration and production sector are based on four NAICS code industries (1997): Crude Petroleum and Natural Gas Extraction (211111), Drilling Oil and Gas Wells (213111), Support Activates for Oil and Gas Operations (213112), and Geophysical Exploration and Mapping Services (54360).

[15] The data in Table 17 are for establishments in Texas, the state in closest proximity to the Western Gulf of Mexico program area. However, establishments located outside of Texas, most notably in Louisiana, Mississippi, Alabama, and Florida, also support oil and natural gas exploration and development in the Western GOM (see Tables 6 and 26 for information on the other Gulf Coast states). Thus, the data in Table 17 may underestimate the economic activity in the oil and gas sector potentially affected by a CDE in the Western GOM program. Similarly, many of the establishments reflected in Table 17 support offshore oil and gas exploration in other Gulf of Mexico program areas. A portion of the economic activity shown in Table 17 may therefore apply to other program areas.

proportion to their offshore oil and natural gas production in 2011, it is estimated that the indirect and induced economic impacts of oil and gas production in the Western GOM include employment impacts of 46,000 jobs, wages of $2.3 billion, and GDP of $4.3 billion.

Table 17: Economic Impacts of Offshore Oil and Natural Gas Exploration and Production in the Western GOM, 2005-2009

Year	Establishments	Employment	Wages (million$)	GDP (million$)
2009	2,139	90,937	$13,243.5	$61,215.4
2008	2,140	95,223	$14,048.7	$82,416.7
2007	2,058	89,170	$12,861.4	$70,461.9
2006	1,876	82,794	$10,945.5	$63,853.9
2005	1,782	75,506	$9,617.1	$56,534.1

Source: NOEP, 2012a.
Note: NOEP defines **e**stablishments as places of work. Employment is measured by the location of an establishment, not the firm, as there are many firms that have multiple establishments.

Table 18 summarizes the volume of offshore oil and natural gas production in the Western GOM in 2010 and 2011. Production in this area accounts for approximately 10 to 15 percent of offshore oil production and 15 to 20 percent of offshore natural gas production in the GOM. In addition, the data presented in the table show that the vast majority of production in the Western GOM is in federal rather than state waters.

Table 18: Offshore Oil and Natural Gas Production in the Western GOM: 2010-2011

	Oil (millions barrels)		Gas (million MCF)	
Year	2010	2011	2010	2011
TOTAL	**52.2**	**57.2**	**413.0**	**338.2**
Federal	52.1	56.8	412.8	337.4
State	0.059	0.417	0.203	0.834

Sources: Federal production data from BOEM (2012). State production data from Railroad Commission of Texas (2012).

5.3 Public Use in the Western Gulf of Mexico Coastal Zone

5.3.1 Coastal Recreation

The Western GOM area provides an abundance of opportunities for coastal recreation. The Texas coast is home to Padre Island National Seashore, eight NWRs (Laguna Atacosa, Aransas, Big Boggy, San Bernard, Brazoria, Anahuac, McFadden, and Texas Point), and numerous beaches. The public takes more than 30 million trips to the beach and other coastal areas per year in the Western GOM (Roach et al. 2001).

Table 19 presents the annual number of participants for coastal recreational activities in the Western GOM in 2000. Beach visitation and swimming are by far the most popular activities, with more than three million annual participants each. Saltwater fishing and wildlife- and scenery-viewing are also significant, with more than one million annual participants.

Table 19: Western GOM Coastal Recreation Participation, 2000

RECREATION ACTIVITY	TEXAS (millions of participants)
Visit Beaches	3.851
Visit Waterside Besides Beaches	0.488
Swimming	3.076
Snorkeling	0.165
Scuba Diving	0.070
Surfing	0.124
Wind Surfing	0.101
Saltwater Fishing	1.695
Motorboating	0.820
Sailing	0.159
Personal Watercraft Use[1]	0.272
Canoeing	0.046
Kayaking	0.021
Rowing	0.020
Water-skiing	0.144
Bird Watching	0.805
Viewing Other Wildlife in Water-based Surroundings	0.745
Viewing or Photographing Scenery in Water-based Surroundings	1.193
Hunting Waterfowl	0.075
Any Coastal Activity[2]	**6.168**

Source: Leeworthy & Wiley, 2001.
[1]Personal watercraft use likely includes some other recreational categories in the table, such as canoeing and kayaking, but also includes the use of watercraft such as jet skis and wave runners.
[2]The total number of coastal activity participants is not the sum of the rows that precede it, because the categories do not account for double counting. For example, people who go to the beach and swim are counted under both activities.

The economic value that the public places on recreational activities that involve coastal resources, particularly those that do not involve expenditures, is highly uncertain. Nevertheless, the economic literature includes estimates for some activities. For example, USFWS estimated the median per-day values the public places on hunting and wildlife viewing in Texas to be $62 per day for hunting and $25 for wildlife viewing (USFWS, 2009). Another study (Parsons *et al.*, 2009) calculated the value of a trip to the beach by determining economic losses attributable to hypothetical beach closures at the Padre Island National Seashore. Using a travel cost random utility maximization model developed for the National Park Service (NPS), that study established a mean loss of approximately $20 per trip. **Table 20** presents recent visitation statistics for Padre Island, approximately 500,000 visitors over the course of 2011.

Table 20: Padre Island National Seashore Visitation Statistics, 2011 (participants)

Month	Rec Visits	Tent Campers	RV Campers	Back Country Campers	Total Overnight Stays
January	33,025	321	4,604	814	5,756
February	26,226	459	4,274	814	5,562
March	57,700	2,028	5,694	819	8,577
April	45,996	1,598	3,788	1,366	6,817
May	41,739	1,966	1,712	1,367	5,112
June	66,525	1,898	875	1,370	4,224
July	100,311	2,770	1,126	1,372	5,357
August	45,681	1,985	861	1,365	4,272
September	49,958	1,337	815	1,361	3,557
October	36,943	1,366	975	1,360	3,739
November	23,399	610	2,271	816	3,722
December	15,370	362	1,941	814	3,133
2011 Total	**542,873**	**16,700**	**28,936**	**13,638**	**59,828**
Source: National Park Service, 2012.					

5.3.2 Recreational Fishing

The Western GOM accounts for a sizeable portion (10 percent) of recreational fishing expenditures in the United States. Nationally, expenditures by recreational marine anglers in Texas are second behind Florida. For example, Texas expenditures on recreational fishing reached approximately $3.2 billion in 2006, including the costs of travel, equipment, and other goods and services (Gentner and Steinback, 2008). The $3.2 billion spent by anglers resulted in a direct increase of $1 billion in GDP (value added). Indirect and induced effects led to an additional $1 billion in GDP, for a total impact on GDP of $2.0 billion. **Table 21** presents a summary of the economic impacts associated with marine recreational fishing expenditures in the Western GOM.[16]

The economic activity summarized in **Table 21** reflects approximately 15 million fishing days among 1.1 million residents and nonresidents of Texas in 2006 (Southwick Associates 2006). A catastrophic event in the Western GOM could result in the closure of offshore waters for an extended period, greatly reducing participation and the associated economic impacts of recreational fishing summarized in **Table 21**.

[16] Note that the economic impacts from recreational fishing presented here may overlap with some of the impacts of the commercial tourism and recreation sector described above, such as boat rentals. However, the extent of that overlap is not possible to determine given the available data.

Table 21: Total Economic Impacts from Marine Recreational Fishing Expenditures in Texas, 2006

Impact Type	Status	Expenditures	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Output (million$)	Resident	$3,109.5	$2,241.4	$992.0	$858.6	$4,092.0
	Nonresident	$68.7	$56.4	$24.4	$24.1	$105.0
	Total	**$3,178.2**	**$2,297.8**	**$1,016.4**	**$882.8**	**$4,197.0**
Value Added (million$)	Resident	$3,109.5	$1,049.0	$538.4	$505.0	$2,092.4
	Nonresident	$68.7	$34.2	$13.0	$15.2	$62.5
	Total	**$3,178.2**	**$1,083.2**	**$551.5**	**$520.2**	**$2,154.9**
Income (million$)	Resident	$3,109.5	$705.9	$325.7	$259.8	$1,291.3
	Nonresident	$68.7	$18.7	$7.32	$8.85	$34.8
	Total	**$3,178.2**	**$724.5**	**$333.0**	**$268.6**	**$1,326.2**
Employment (jobs)	Resident	$3,109.5	19,729	6,670	6,812	33,211
	Nonresident	$68.7	610	143	212	965
	Total	**$3,178.2**	**20,339**	**6,813**	**7,024**	**34,175**

Source: Gentner & Steinback, 2008.
Note: Direct effects occur when anglers purchase goods at fishing retailers and other businesses. Indirect effects occur when those businesses pay operating expenditures and purchase supplies from wholesale trade businesses and manufacturers. Induced effects occur when employees in both the directly affected and indirectly affected sectors expend their income in the normal course of household consumption. Total impacts are the sum of direct, indirect, and induced impacts.

5.3.3 Subsistence

No data were readily available on consumption-oriented fishing for communities on the Western GOM. Surveys, discussions, and observations have suggested the widespread importance of fish, shrimp, crabs, and oysters to the livelihoods of communities on the Gulf coast of Texas. However, no systematic surveys yet exist of subsistence practices in this area (NOAA, 2005).

Subsistence may be highest in those areas NOAA characterizes as fishing communities, those that economically depend on a combination of recreational, commercial, and subsistence fishing, shrimping, oystering, *et cetera*. In the Western GOM, these communities are primarily rural, with relatively high poverty rates. Of the 68 fishing communities identified by NOAA along the Gulf Coast in Texas, 5 had poverty rates double or more the national average in 2006. In addition, almost all fishing communities in Texas have a median income lower than the national average. These communities also have a relatively high percentage of non-English speaking residents (NOAA, 2009b).

6. The Eastern Gulf of Mexico[17]

This section documents the various resources in and near the Eastern Gulf of Mexico Planning Area that would potentially be affected by a CDE occurring in the smaller program area. Given the limited activity anticipated in the program area, the likelihood of a CDE is even lower than in

[17] The Eastern GOM Program Area, as opposed to the full planning area, is not near shore, but this section includes descriptions of resources and activities along the Gulf Coast of Florida plus a small portion of Alabama's coast. Because most of Alabama's coastal land abuts the Central GOM planning area, this discussion of economic activity and resources potentially affected by a CDE in the Eastern GOM Program Area focuses on Florida's Gulf Coast.

the other areas of the GOM, and the program area's distance from shore would indicate that a smaller percentage of any discharged oil might reach land. However, consistent with the sections above, this discussion focuses on the biological, economic, and public use resources in and closest to the program area. Note that a CDE associated with oil displacing Eastern GOM oil under the No Sale Option may affect resources in areas outside the area described below. In other words, program decisions involving the production of oil in the Eastern GOM program area involve a tradeoff between potential CDE impacts from program-related production and CDE impacts associated with oil obtained from other sources. For example, absent program production in the Eastern GOM, oil imports to the East Coast or to other parts of the GOM may increase. A CDE associated with these imports would potentially affect resources in these areas.

6.1 Physical and Biological Resources in the Eastern Gulf of Mexico and the Nearby Coastal Zone

The Eastern GOM, along the western coast of Florida, exhibits significant ecological diversity.[18] Barrier islands help form tidal estuaries where swamps transition to salt marshes. In addition, tropical coral reefs inhabit the shallow continental shelf along Florida's Gulf Coast, extending from the Florida Keys to the Snapper Banks near Pensacola. These reefs support a wide variety of fish and other marine life, including species found nowhere else in the GOM. In conjunction with intertidal oyster bars, barrier islands, tidal salt marshes, mangroves, and submerged seagrass meadows, these reefs help form a buffer for coastal communities to storms and hurricanes.

Sandy beaches along Florida's Gulf Coast and the Florida Keys serve as critical habitat for several endangered birds, beach mice, and sea turtles. To highlight the diversity of bird species that rely on these beaches, **Table 22** presents an overview of the most common beach-nesting birds in the Tampa Bay region, as well as their usual nesting dates, hatch dates, and fledge dates.

Table 22: Beach-nesting Birds Nesting Schedule for the Tampa Bay Region

Species	Onset Of Nesting	Incubation (Days)	Hatch Date	Age At First Flight (Days)	Fledge Date
Snowy Plover	April 1-May 30	26-32	April 27-July 2	28-32	May 25-Aug 4
Wilson's Plover	April 1-May 30	23-25	April 24-June 25	21	May 15-July 16
American Oystercatcher	March 20-May 30	24-28	April 13-June 27	35	May 18-Aug 2
Willet	March 25-May 30	22-29	April 16-June 28	28	May 14-Aug 3
Laughing Gull	May 7-May 30	20	May 27-June 20	35	July 1-July 25
Caspian Tern	May 7-May 30	20-22	May 27-June 22	30-35	June 26-July 27
Royal Tern	May 1-May 15	28-35	May 29-June 19	28-35	June 26-July 24
Sandwich Tern	May 5-May 15	21-29	May 26-June 13	28-32	May 23-July 15
Gull-billed Tern	May 7-May 30	22-23	May 29-June 22	28-35	June 26-July 26
Least Tern	May 1-May 30	20-25	May 21-June 24	19-20	June 9-July 14
Black Skimmer	May 10 to June 30	21-23	May 31-July 23	23-25	June 23-Aug 17
Source: Audubon of Florida					

[18] Except where otherwise noted, the discussion presented here is adapted from Gulf Coast Ecosystem Restoration Task Force (2011).

6.2 Economic Activity in the Eastern Gulf of Mexico and the Nearby Coastal Zone

6.2.1 Commercial Fishing

In 2009, the seafood industry in the Eastern GOM generated a total of approximately $13 billion in sales. **Table 23** presents an economic summary of the seafood industry for the Eastern GOM, including the impacts of the industry on jobs, sales, income, and total value added. Relative to the other the GOM areas, commercial fishing in West Florida yields the most significant economic impacts, generating 65,000 jobs, $2.4 billion in income, and $4.3 billion in value added in 2009, though much of this reflects activity among importers (NOAA, 2009a). A catastrophic event that resulted in the closure of Eastern GOM fisheries for an extended period would reduce sales, output, and income across the other segments of the industry; import activity could increase if supply from local sources declines.

Table 23: Economic Impacts of the Eastern GOM Seafood Industry, 2009

Impacts	Jobs	Sales (million$)	Income (million$)	Value Added (million$)
Commercial Harvesters	4,775	312.2	98.0	130.3
Seafood Processors & Dealers	3,781	606.5	117.4	230.8
Importers	34,493	9,488.4	1,520.7	2,892.5
Seafood Wholesalers & Distributors	8243	950.0	373.0	464.0
Retail Sectors	13,452	1,631.3	317.4	623.6
Total Impacts	**64,744**	**12,988.4**	**2,426.4**	**4,341.2**
Source: NOAA, 2009a.				

6.2.2 Tourism and Recreation

Tourism and recreation in West Florida supported roughly 10,000 establishments, 144,000 jobs, and $3 billion in wages in 2009. **Table 24** details the level of activity across the various industries supported by tourism and recreation in the Eastern GOM.[19] As indicated in the table, eating and drinking places account for more than two-thirds of Eastern GOM employment supported by tourism and recreation and nearly 60 percent of tourism-related wages and GDP. Overall, tourism and recreation on the Gulf coast, as measured by the ocean economy data in the table, constituted slightly less than one percent of Florida's total GDP in 2009. This figure grows to 1.6 percent when using the coastal economy data. Within the region, economic activity related to tourism and recreation is concentrated in the south-central counties of West Florida, particularly Pinellas and Hillsborough counties, both in central Florida.

[19] The data in Table 24 describe both the "ocean" and coastal economies of Western Florida as derived from county level data. "Ocean" economy data are limited to industries and activities in the "tourism and recreation" sector that are defined as being ocean-dependent. "Coastal" economy data comprise all industries and activities in the "leisure and hospitality" sector in counties that are adjacent, in whole or in part, to the GOM shoreline.

Table 24: Tourism and Recreation in West Florida, 2009

Industry	Establishments[2]	Employment	Wages (millions of $)	GDP (millions of $)
Ocean Economy Data				
Amusement and Recreation Services NEC[1]	785	3,342	$82.1	$199.2
Boat Dealers	501	2,460	$98.3	$217.4
Eating & Drinking Places	9,733	143,867	$2,476.2	$5,234.9
Hotels & Lodging Places	1,551	50,161	$1,348.1	$3,341.0
Marinas	322	2,403	$74.1	$146.0
Recreational Vehicle Parks & Campsites	104	624	$13.5	$33.5
Scenic Water Tours	310	981	$29.4	$55.4
Sporting Goods Retailers	41	232	$8.41	$26.6
Zoos, Aquaria	53	1,299	$34.9	$68.9
Total	**13,399**	**205,367**	**$4,165**	**$9,323**
Coastal Economy Data (Shore-adjacent Counties)				
All sectors	15,367	274,413	$5,543.1	$11,605.4

Source: NOEP, 2012a; NOEP, 2012b.
Notes:
1. NEC – Not Elsewhere Classified
2. NOEP defines **e**stablishments as places of work. Employment is measured by the location of an establishment, not the firm, as there are many firms that have multiple establishments.

6.2.3 Commercial Shipping and Transport

Aside from through traffic traveling to other ports, commercial shipping in the Eastern GOM is largely limited to shipments to and from the Port of Tampa, Port Manatee, the Port of Panama City, and the Port of Pensacola. With approximately 35 million tons of annual shipments and receipts in 2009, the Port of Tampa is the largest of these ports. This figure ranks it as the 17th largest U.S. port. The volume of cargo flowing through the other three ports in the Eastern GOM was approximately 6.1 million tons in 2009 (USACE, 2009).

6.2.4 Oil and Natural Gas Production

The Eastern GOM also supports natural gas and, to a lesser extent, oil (condensate) production. Oil and natural gas extraction in this area is currently limited to federal waters, as Florida state law has prohibited offshore drilling in state-controlled waters since the early 1990s (Florida Coastal and Ocean Coalition Steering Committee, 2010). **Table 25** summarizes oil and natural gas production in the area for 2010 and 2011. Comparing the data in **Table 25** to the data presented in previous sections, production volumes in the Eastern GOM are much lower than in the Central and Western GOM. Natural gas production in the Eastern GOM is approximately one-third that in the Western GOM and less than one-tenth in the Central GOM. Oil production in the area is several orders of magnitude lower than in the Western and Central GOM.

Table 25: Oil and Natural Gas Production in the Eastern GOM, 2010 and 2011

	Oil (millions barrels)		Gas (million MCF)	
Year	2010	2011	2010	2011
TOTAL	**0.037**	**0.020**	**122.9**	**105.7**
Federal	0.037	0.020	122.9	105.7
State	0	0	0	0

Source: BOEM, 2012 for federal data. No oil or gas is produced in Florida state waters.
*MCF= thousands of cubic feet

To highlight the economic significance of the offshore oil and natural gas industry in the Eastern GOM, **Table 26** summarizes the employment, wages, and GDP for the industry for the 2002 to 2006 period. [20,21] As indicated in the table, the industry directly supported more than 1,100 jobs and contributed more than $170 million to the region's GDP in 2006. As context, the $170 million in GDP represents less than 0.03 percent of Florida's state GDP in 2006.

While informative, the data in **Table 26** are limited in that they reflect only the direct economic effects of offshore oil and natural gas production on the Eastern GOM economy. Economic activity within the industry also leads to indirect and induced economic impacts. Data on these impacts specific to the Eastern GOM are not readily available, but a 2010 study estimates the indirect and induced effects of oil and gas production for the entire GOM (IHS Global Insight, 2010). Allocating these effects to the individual GOM program areas in proportion to their offshore oil and natural gas production in 2011 suggests indirect and induced economic impacts of oil and natural gas production in the Eastern GOM include employment impacts of 7,300 jobs, wages of $367 million, and GDP of $684 million.

[20] Data for the oil and gas exploration and production sector in Table 26 are based on four NAICS code industries (1997): Crude Petroleum and Natural Gas Extraction (211111), Drilling Oil and Gas Wells (213111), Support Activates for Oil and Gas Operations (213112), and Geophysical Exploration and Mapping Services (54360).

[21] The data in Table 26 are for establishments in Florida, the state in closest proximity to the Eastern Gulf of Mexico program area. However, establishments located outside of Florida, most notably in Texas, Louisiana, Mississippi, and Alabama, also support oil and natural gas exploration and development in the Eastern GOM (see Tables 6 and 17 for information on the other Gulf Coast states). Thus, the data in Table 26 may underestimate the economic activity in the oil and gas sector potentially affected by a CDE in the Eastern GOM program area. Similarly, many of the establishments reflected in Table 26 may support offshore oil and gas exploration in other Gulf of Mexico program areas. A portion of the economic activity shown in Table 26 may therefore apply to other program areas.

Table 26: Economic Impacts Offshore Oil and Natural Gas Exploration and Production in the Eastern GOM, 2002-2006

Year	Establishments	Employment	Wages (million$)	GDP (million$)
2006	165	1,163	$51.8	$170.2
2005	D	D	D	D
2004	66	431	$16.2	$41.1
2003	58	388	$12.7	$27.3
2002	64	412	$12.8	$24.7

D = disclosure issues prevented these data from being presented.
Source: NOEP 2012a
Note: NOEP defines **e**stablishments as places of work. Employment is measured by the location of an establishment, not the firm, as there are many firms that have multiple establishments.

6.3 Public Use in the Eastern Gulf of Mexico Coastal Zone

6.3.1 Coastal Recreation

Coastal recreation represents a major public use of coastal and marine resources in the Eastern GOM. The Gulf Coast of Florida supports a variety of recreational activities, in particular beach visitation, swimming, and recreational fishing. **Table 27** highlights these and other recreational activities and presents participation data for each activity.[22] Of the 15 million coastal recreation participants in Florida's Gulf Coast counties, approximately 10 million went to the beach and 9 million went swimming. Fishing, snorkeling, viewing or photographing scenery, and motorboat use also attracted significant numbers of participants.

[22] Like comparable data elsewhere in this report, values were estimated based on data from Leeworthy and Wiley (2001). However, because that study presented recreational activity data by state, the data for Florida reflect recreational activity on both the Atlantic and Gulf coasts. To isolate recreational activity on the Gulf Coast, the aggregate Florida data from Leeworthy and Wiley was apportioned based on County Business Pattern data from the U.S. Census. County Business Patterns is an annual survey that provides county-level economic data by NAICS code. In Florida, the most recent data show that the breakdown between the Atlantic and Gulf Coast counties for the Recreational Goods Rental industry (NAICS Code 532292) was 28 and 72 percent, respectively, for employment, and 31 and 69 percent for the number of establishments. Therefore, this analysis approximated the economic breakdown of coastal recreational in Florida to be 70 percent on the Gulf Coast and 30% on the Atlantic Coast.

Table 27: Eastern GOM Coastal Recreation Participation, 2000

RECREATION ACTIVITY	WEST FLORIDA (millions of participants)
Visit Beaches	10.6722
Visit Waterside Besides Beaches	1.2607
Swimming	9.8231
Snorkeling	2.0062
Scuba Diving	0.5614
Surfing	0.4081
Wind Surfing	0.0763
Saltwater Fishing	3.2886
Motorboating	2.3359
Sailing	0.6482
Personal Watercraft Use[1]	1.1382
Canoeing	0.1932
Kayaking	0.2366
Rowing	0.1071
Water-skiing	0.4291
Bird Watching	2.3611
Viewing Other Wildlife in Water-based Surroundings	1.9922
Viewing or Photographing Scenery in Water-based Surroundings	2.744
Hunting Waterfowl	0.0504
Any Coastal Activity[2]	**15.442**

Source: Leeworthy & Wiley, 2001.

[1] Personal watercraft use likely includes some other recreational categories in the table, such as canoeing and kayaking, but also includes the use of watercraft like jet skis and wave runners.

[2] The total number of coastal activity participants is not the sum of the rows that precede it, because the categories do not account for double counting. For example, people who go to the beach and swim are counted under both activities.

In addition to several miles of beaches, the Gulf coast of Florida is home to Everglades National Park, the largest subtropical wilderness in the United States (NPS, 2011). Over the past 10 years, annual visitation has hovered around 1 million. Visitation to the Everglades usually peaks in the late winter and early spring. For example, in 2011 the peak month for visitation was February, with more than 130,000 visitors, while September had the fewest visitors, with approximately 42,700 (NPS Stats). **Table 28** presents additional detail on visitation to the park in 2011.

Table 28: Everglades National Park, 2011 (participants)

Month	Rec Visits	Non-Rec Visits	Tent Campers	RV Campers	Back Country Campers	Total Overnight Stays[1]
January	108,115	629	1,896	2,970	3,368	8,322
February	121,341	789	1,942	4,135	2,836	8,963
March	131,176	884	1,927	1,925	3,186	7,131
April	92,257	771	67	69	1,039	1,176
May	55,073	341	24	13	0	37
June	52,165	195	14	28	68	110
July	56,712	195	6	23	52	81
August	52,814	141	7	9	16	32
September	42,787	102	10	49	124	183
October	54,443	191	62	57	340	459
November	76,578	182	505	348	517	1,378
December	90,890	267	581	405	0	996
TOTAL	**934,351**	**4,687**	**7,041**	**10,031**	**11,546**	**28,618**

Source: NPS Stats
[1] Total overnight stays includes some miscellaneous campers; therefore rows may not sum across.

The value of the coastal recreational losses that would result from a catastrophic event in the Eastern GOM would depend on the characteristics of the spill, conditions at the time of the spill and its aftermath (e.g., wind direction, currents, etc.), and the value derived by the public from various recreational activities. As described in previous sections, the value of recreational activities is uncertain and varies by location and activity. USFWS estimates that the median value the public places on wildlife viewing in Florida is $25 per day (USFWS, 2009).

6.3.2 Recreational Fishing

In 2008, residents of and visitors to the Eastern GOM area took approximately 14 million recreational fishing trips (Pritchard 2009).[23] Residents of Florida accounted for most of the economic impacts associated with recreational fishing in Florida's Gulf Coast counties. According to NOAA, Floridians accounted for 85 percent of the resources expended on recreational fishing in the Eastern GOM. Recreational fishing expenditures from residents and nonresidents supported 75,000 jobs and a total value added (GDP) of $4.2 billion. Table 29 presents a summary of recreational fishing expenditures in the Eastern GOM.[24] Closures of recreational fisheries in response to a catastrophic spill or blowout event in the Eastern GOM would reduce participation in recreational fishing as well as the associated economic activity.

[23] The number of recreational fishing trips exceeds the participation estimates for fishing presented above in Table 27 because a participant may take several fishing trips each year.

[24] Note that the economic impacts from recreational fishing presented here may overlap with some of the impacts of the commercial tourism and recreation sector described above, such as boat rentals. However, the extent of that overlap is not possible to determine given the available data.

Table 29: Total Economic Impacts Generated from Marine Recreational Fishing Expenditures in Eastern Gulf of Mexico, 2006

Impact Type	Status	Expenditures (million$)	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Output (million$)	Resident	**Resident**: $7,496.3 **Non-resident**:$1,460.2 **Total**: $8,956.6	$3,475.7	$1,305.7	$1,399.9	$6,181.3
	Non-Resident		$899.1	$310.7	$432.6	$1,642.5
	Total		**$4,374.8**	**$1,616.4**	**$1,832.6**	**$7,823.8**
Value Added (million$)	Resident		$1,708.6	$728.8	$854.4	$3,291.8
	Non-Resident		$485.9	$169.6	$287.8	$943.3
	Total		**$2,194.5**	**$898.4**	**$1,142.1**	**$4,235.1**
Income (million$)	Resident		$1,218.8	$456.5	$458.7	$2,134.0
	Non-Resident		$335.2	$105.5	$178.0	$618.7
	Total		**$1,554.0**	**$562.0**	**$636.6**	**$2,752.7**
Employment (jobs)	Resident		37,394	9,603	12,397	59,393
	Non-Resident		9,422	2,412	4,030	15,864
	Total		**46,816**	**12,015**	**16,427**	**75,257**

Source: Gentner & Steinback, 2008
Note: Direct effects occur when anglers purchase goods at fishing retailers and other businesses. Indirect effects occur when those businesses pay operating expenditures and purchase supplies from wholesale trade businesses and manufacturers. Finally, induced effects occur when employees in both the directly affected and indirectly affected sectors expend their income in the normal course of household consumption.

6.3.3 Subsistence

As noted in prior sections, information on subsistence fishing, shrimping, and other activities is extremely limited for U.S. waters outside of Alaska. Subsistence may be most significant in those areas designated as "fishing communities" by NOAA because of their strong ties to commercial and recreational fishing (see NOAA, 2009b). The fishing communities in the Eastern Gulf exhibit significant diversity. These communities include some of West Florida's largest cities, such as Tampa and St. Petersburg, and other smaller, more rural communities where individuals are more likely to depend on their harvests for basic subsistence.

7. Cook Inlet, Alaska

Cook Inlet is a key economic center of Alaska, and is home to more than half the state's residents (ECONorthwest, 2010). A catastrophic blowout event that damaged wildlife and ecosystems in this area could adversely affect recreation, commercial fishing, subsistence harvests, and tourism, all of which are important to the region's economy and way of life.

A CDE associated with oil produced in the Cook Inlet program area may also affect resources in other planning areas. Because much of the oil produced in Cook Inlet is shipped via tanker to ports on the West Coast of the coterminous United States, resources on the West Coast may be impacted by production activity in Cook Inlet. For example, a spill event involving a tanker carrying Cook Inlet oil may affect coastal resources in southern California or near Port Angeles, Washington. Similarly, tankers carrying Cook Inlet oil from the Port of Valdez could affect resources in other Alaska planning areas, particularly the Gulf of Alaska and Kodiak Planning

Areas. However, under the No Sale Option, foreign imports to West Coast ports would increase to compensate for foregone OCS oil, also posing risks to West Coast resources.

7.1 Physical and Biological Resources in Cook Inlet and the Nearby Coastal Zone

A wide array of ecosystem services in and along Cook Inlet support south-central Alaska's recreational and commercial activities.[25] The Cook Inlet marine ecosystem is a semi-enclosed tidal estuary, extending approximately 370 kilometers (230 miles) in south-central Alaska. The Inlet's salt water input flows from Shelikof Strait and the Gulf of Alaska, while its fresh water flows from several large rivers, including the Chuitna. Surface currents within the inlet, which would move hazardous material toward shore in the case of a catastrophic event, are affected by both tidal movements and winds, which can be highly variable. The large tidal range in Cook Inlet also continually breaks up ice-floes, the size and thickness of which change constantly.

Cook Inlet's marine ecosystems are among the most productive in the world, particularly with respect to fisheries. Migratory marine and land birds are common. Some endangered species, including Stellar sea lions and beluga whales, live in the region as well, which has led to restrictions on water use to relieve human pressure on these species. Like other parts of coastal Alaska, Cook Inlet's ecosystems are prone to damage due to regular human activities, such as marine transport, commercial fishing, and oil and natural gas production. A catastrophic spill or blowout event could severely compound these pressures.

7.2 Economic Activity in Cook Inlet and the Nearby Coastal Zone

7.2.1 Commercial Fishing

A catastrophic blowout or spill event in the waters of Cook Inlet could significantly damage the area's commercial fishing industry. Within the Cook Inlet, salmon (particularly sockeye salmon) accounts for most of the economic value derived by the fishing industry. In 2008, the commercial fishing industry harvested approximately 21 million pounds of salmon with a value of $22.3 million (Resource Development Council for Alaska, Inc. (RDC), 2010). Other species harvested in Cook Inlet include lingcod, Pacific cod, sablefish, rock fish, and herring. The harvesting of salmon and other species supports the region's seafood processing industry. **Table 30** summarizes the economic impacts of Cook Inlet's salmon and seafood processing industries on the region itself and Alaska more broadly. As indicated in the table, these two industries combined account for nearly 4,000 jobs and $130 million in GDP (RDC, 2010).

[25] Text in this section was adapted from Alaska Ocean Observing System, 2005.

Table 30: Economic Effects of Salmon Fishing in Cook Inlet, 2008

Impact Type	Output (million$)	Employment	Income (million$)	Value Added (million$)
Cook Inlet Salmon Fishing: Impact on Cook Inlet Economy in 2008				
Direct Effect	$22.3	628.7	$4.72	$5.13
Indirect Effect	$11.0	34.2	$2.22	$4.13
Induced Effect	$5.71	45.9	$1.78	$3.37
Total Effect	**$39.0**	**708.7**	**$8.72**	**$12.6**
Cook Inlet Salmon Fishing: Impact on Alaska Economy in 2008				
Direct Effect	$22.3	628.7	$4.72	$5.13
Indirect Effect	$11.7	35.3	$2.30	$4.27
Induced Effect	$5.79	46.6	$1.81	$3.41
Total Effect	**$39.8**	**710.5**	**$8.83**	**$12.8**
Cook Inlet Seafood Processing: Impact on Cook Inlet Economy in 2008[1]				
Direct Effect	$204.5	616.2	$21.2	$23.7
Indirect Effect	$161.8	2,145.2	$40.3	$63.0
Induced Effect	$49.8	400.0	$15.6	$29.4
Total Effect	**$416.1**	**3,161.5**	**$77.2**	**$116.1**
Cook Inlet Seafood Processing: Impact on Alaska Economy in 2008				
Direct Effect	$204.5	616.2	$21.2	$23.7
Indirect Effect	$165.0	2,159.7	$41.0	$64.1
Induced Effect	$50.6	405.9	$15.9	$29.8
Total Effect	**$420.1**	**3,181.8**	**$78.1**	**$117.6**

[1] Processing data include species besides salmon, such as herring.
Source: RDC, 2010
Note: Direct effects occur when anglers purchase goods at fishing retailers and other businesses. Indirect effects occur when those businesses pay operating expenditures and purchase supplies from wholesale trade businesses and manufacturers. Induced effects occur when employees in both the directly affected and indirectly affected sectors expend their income in the normal course of household consumption. Total effects are the sum of direct, indirect, and induced effects.

7.2.2 Tourism and Recreation

Tourism is a critical component of the Alaskan economy, particularly in the Cook Inlet region. The sector has grown at a higher rate than any other in the state or region for the past few decades. Anchorage is a focal point for visitors to the state, and Cook Inlet is a major destination for outdoor tourism and recreation, particularly for recreational fishing (ECONorthwest, 2010). Other recreational activities popular among tourists and local residents include camping, hunting, hiking, kayaking, mountain biking, and diving. **Table 31** highlights the importance of the tourism sector in the Kenai Peninsula County, which surrounds most of Cook Inlet.[26] As indicated in the table, tourism accounted for more than $70 million in GDP and in 2009 and

[26] These data describe both the "ocean" and coastal economies of the county. "Ocean" economy data are limited to industries and activities in the "tourism and recreation" sector that are defined as being ocean-dependent. "Coastal" economy data comprise all industries and activities in the "leisure and hospitality" sector in counties that are adjacent, in whole or in part, to the shoreline.

employed 2000 individuals.[27] For perspective on these figures, the Census Bureau estimates county population at approximately 55,000 in 2010 (U.S. Census 2012).

Table 31: Kenai Peninsula County Tourism and Recreation Sector, 2009

Year	Establishments	Employment	Wages (million $)	GDP (million $)
Ocean Economy Data				
2009	264	2,026	$37.3	$73.7
2008	262	2,120	$39.3	$81.5
Coastal Economy Data (Shore-adjacent Counties)				
2009	299	2,308	$39.1	$78.4
2008	300	2,518	$45.7	$92.3

Source: NOEP, 2012a; NOEP, 2012b.
Note: NOEP defines **e**stablishments as places of work. Employment is measured by the location of an establishment, not the firm, as there are many firms that have multiple establishments.

7.2.3 Commercial Shipping

The Port of Anchorage on the eastern end of Cook Inlet is an essential port for many Alaska residents. Ninety percent of all consumer goods are provided to 80 percent of Alaska's population through Anchorage, totaling 4.4 million tons in 2008 (State of Alaska, 2007). In addition to serving as the conduit through which many Alaskans receive goods, the port itself generates significant economic activity. To illustrate the importance of this activity, **Table 32** presents the total economic impacts of the port in 2008. As shown in the table, the port is responsible for more than $100 million in value added (GDP) for the Cook Inlet region. Given the port's significance to the economy, a catastrophic event in Cook Inlet could cause substantial public and economic damage if it seriously disrupted the port's activities.

[27] The values presented here for all recreation in Kenai Peninsula County are similar to the direct economic impacts presented in Table 34 for recreational fishing in Cook Inlet. Because recreational fishing makes up only part of the tourism industry in Cook Inlet, one would expect the economic impacts for all tourism to be significantly higher than for the recreational fishing only. However, a significant portion of the economic impacts for recreational fishing presented in Table 34 include types of expenditures not reflected in the NOEP data in Table 31. For example, these data include angler expenditures vehicle fuel, groceries, fish processing, and airfare, none of which are included in the NOEP data.

Table 32: Economic Impact of the Port of Anchorage, 2008

Economic Impact of the Port of Anchorage on Cook Inlet				
Impact Type	**Output (million$)**	**Employment**	**Income (million$)**	**Value Added (million$)**
Direct Effect	$132.7	500.0	$36.0	$59.0
Indirect Effect	$36.7	222.4	$11.5	$20.7
Induced Effect	$38.9	311.8	$12.2	$23.0
Total Effect	$208.4	1,034.2	$59.7	$102.8
Economic Impact of the Port of Anchorage on the State of Alaska				
Impact Type	**Output**	**Employment**	**Income**	**Value Added**
Direct Effect	$132.7	500.0	$36.0	$59.0
Indirect Effect	$40.2	251.3	$13.4	$23.0
Induced Effect	$40.1	320.9	$12.6	$23.6
Total Effect	$231.0	1,072.2	$62.0	$105.7

Source: RDC (2010)
Note: Direct effects occur when anglers purchase goods at fishing retailers and other businesses. Indirect effects occur when those businesses pay operating expenditures and purchase supplies from wholesale trade businesses and manufacturers. Induced effects occur when employees in both the directly affected and indirectly affected sectors expend their income in the normal course of household consumption.

7.2.4 Oil and Gas Production

The oil and natural gas sector has a strong presence in state waters within Cook Inlet.[28] The Alaska Department of Natural Resources (DNR) estimates that 4.5 million barrels of oil were produced in Cook Inlet in 2008, along with 149.7 billion cubic feet of natural gas. At an estimated first purchase price of $95.04 per barrel of oil and a wellhead price of $6.14 per mcf of natural gas, the total value for Cook Inlet's oil and natural gas production sector in 2008 was approximately $1.4 billion. Accounting for indirect and induced effects, a 2010 study estimates that the full economic impact of this sector in terms of value added totaled nearly $1.3 billion in 2008, as summarized in **Table 33** (RDC, 2010).

[28] No oil or gas exploration is currently taking place in Cook Inlet's federal waters (Associated Press, 2012).

Table 33: Economic Impact of Oil and Natural Gas Development in Cook Inlet, 2008

Economic Impact of Cook Inlet Oil and Natural Gas Development on Cook Inlet Economy				
Impact Type	**Output (million$)**	**Employment**	**Income (million$)**	**Value Added (million$)**
Direct Effect	$1,388	1,143	$301	$889
Indirect Effect	$337	1,430	$102	$182
Induced Effect	$322	2,580	$101	$190
Total Effect	$2,047	5,153	$505	$1,261
Economic Impact of Cook Inlet Oil and Natural Gas Development on Alaska Economy				
Impact Type	**Output**	**Employment**	**Income**	**Value Added**
Direct Effect	$1,388	1,143	$301	$889
Indirect Effect	$353	1,469	$105	$189
Induced Effect	$324	2,612	$103	$193
Total Effect	$2,067	5,224	$508	$1,271

Source: RDC (2010)
Note: Direct effects occur when anglers purchase goods at fishing retailers and other businesses. Indirect effects occur when those businesses pay operating expenditures and purchase supplies from wholesale trade businesses and manufacturers. Induced effects occur when employees in both the directly affected and indirectly affected sectors expend their income in the normal course of household consumption.

7.3 Public Use in Cook Inlet and the Nearby Coastal Zone

7.3.1 Recreational Fishing

Most of south-central Alaska's recreational activity is based in the Cook Inlet area. The Kenai River, on the south side of the Inlet, is a popular destination for recreational salmon fishing. Other species, such as halibut, are also popular in the communities along Cook Inlet. Almost three quarters of all sport fishing in Alaska in 2007 took place in the south-central region of Alaska. In that year, Cook Inlet anglers spent approximately $733 million, which supported 8,056 jobs and generated $55 million in state and local taxes (Alaska DNR, 2007).

The economic impacts of recreational fishing in Cook Inlet reflect fishing activity among area residents as well as nonresidents. In 2007, residents accounted for approximately 761,000 angler days in the area and nonresidents for 482,000 days (Southwick Associates *et al.*, 2008, as cited in RDC, 2010). **Table 34** presents the economic impacts associated with *nonresident* recreational fishing activity in Cook Inlet, highlighting the importance of tourist recreation to the local economy. Similar data associated with recreational fishing among residents were not readily available.

Table 34: Economic Impact of Sport Fishing in Cook Inlet, 2008

Impact Type	Output (sales)	Employment	Income	Value Added
Impact of Non-Resident & Non-Local Sports Fishing in Cook Inlet on the Cook Inlet Economy - 2008				
Direct Effect	$193,320,711	1,438.4	$37,831,586	$63,360,320
Indirect Effect	$76,131,958	508.3	$22,594,705	$41,284,128
Induced Effect	$49,644,734	398	$15,558,861	$29,293,280
Total Effect	$319,097,403	2,344.7	$75,985,152	$133,937,728
Impact of Non-Resident & Non-Local Sports Fishing in Cook Inlet on the Alaska Economy –2008				
Direct Effect	$193,320,711	1,438.4	$37,831,586	$63,360,320
Indirect Effect	$79,391,655	539.6	$23,751,573	$42,914,456
Induced Effect	$50,579,973	405.5	$15,870,175	$29,822,962
Total Effect	$323,292,339	2,383.40	$77,453,335	$136,097,738

Source: Resource Development Council for Alaska, Inc. 2010.
Note: Direct effects occur when anglers purchase goods at fishing retailers and other businesses. Indirect effects occur when those businesses pay operating expenditures and purchase supplies from wholesale trade businesses and manufacturers. Finally, induced effects occur when employees in both the directly affected and indirectly affected sectors expend their income in the normal course of household consumption.

7.3.2 Subsistence Use

A 2009 report commissioned by the Alaska Department of Administration (ADA) summarizes a survey of nearly 2,500 Alaska households to determine what percent of their food supply was obtained through hunting, fishing, gardening, and berry picking. The survey found that 33 percent of Kenai Peninsula residents (18 percent in Anchorage) reported that they obtained 25 to 50 percent of their food supply from subsistence (McDowell Group, 2009).

8. The Chukchi and Beaufort Seas, Alaska

This section highlights the biological, economic, and public use resources in the Chukchi Sea and Beaufort Sea program areas that could be affected by a CDE. Although this discussion focuses on resources in this specific region, program-related oil production in the Chukchi and Beaufort Seas may also affect resources in other planning areas. Much of the oil produced in these program areas is shipped to ports along the West Coast of the coterminous United States. A tanker spill involving Chukchi or Beaufort Sea oil in this region would potentially affect the area's resources. However, under the No Sale Option, foreign imports to West Coast ports would increase to compensate for foregone OCS oil, also posing risks to West Coast resources.

8.1 Physical and Biological Resources in the Arctic

The Arctic oceans of Alaska's North Slope are unique among U.S. coastal waters. Ice formation typically begins in October and does not begin to break up until April or May. The ecological food web in the Arctic consists of primary producers and other microorganisms, benthic invertebrates, fish, marine mammals, and birds. Primary producers rely on sunlight, making seasonal differences critically important to the functioning of Arctic ecosystems.

The Chukchi and Beaufort Seas are home to a variety of fish, birds, and marine mammals. Among the most important species of fish to local residents are the coregonids, charr, lake trout,

and, to a lesser extent, Pacific herring. Generally, these key species live in nearshore coastal-mixing zones and mixed-ice zones. The most commonly caught marine fish is the Arctic cod, a keystone species in the Arctic food web. Marine mammals, particularly beluga whales and ringed seals, are extremely important for subsistence hunting and are considered ecologically influential predators. Additionally, the migration patterns of both these marine mammals and various Arctic bird species are important for nutrient import and export (Cobb et al., 2008).

8.2 Economic Activity in the Arctic

8.2.1 Commercial Fishing

As of 2009, the United States government has banned commercial fishing in U.S. waters north of the Bering Strait, citing concerns over climate change.[29] Commercial fishing had been extremely limited in the Chukchi and Beaufort Seas prior to the ban. However, the North Pacific Fisheries Management Council feared that a warming Arctic might become a target for commercial fishers if certain fish species, particularly cod and snow crabs, moved northward into warming waters. Extensive commercial fishing is expected to continue further south. An estimated 60 percent of U.S. commercial fishing landings come from the Bering Sea.

8.2.2 Oil and Natural Gas Production

A portion of the oil and natural gas produced in northern Alaska is extracted from offshore facilities. To produce oil and natural gas in this climate, the industry relies on a unique set of technologies to combat the challenges of extreme temperatures, remote locations, and shifting ice flows (Minerals Management Service (MMS), 2002). As shown in **Table 35,** the NorthStar facility in the Beaufort Sea produced approximately 6.1 million barrels of oil in 2010 and 168 million mcf of natural gas. Approximately 17.8 percent of this production is attributed to federal waters.

[29] The information presented in this paragraph is from Winter (2011).

Table 35: Beaufort Sea Oil and Natural Gas Field Production, 2010

Production Month	Oil Production (barrels)	Federal Share of Oil Production (barrels) [1]	Gas Production (mcf)	Federal Share of Gas Production (mcf) [1]
Jan-10	691,558	123,374	17,563,672	3,133,359
Feb-10	621,387	110,855	15,868,443	2,830,930
Mar-10	629,469	112,297	17,328,881	3,091,472
Apr-10	466,784	83,274	12,840,325	2,290,714
May-10	514,995	91,875	13,483,153	2,405,394
Jun-10	523,027	93,308	13,753,267	2,453,583
Jul-10	406,330	72,489	11,401,320	2,033,995
Aug-10	190,328	33,955	5,393,586	962,216
Sep-10	514,405	91,770	15,031,195	2,681,565
Oct-10	527,181	94,049	16,218,148	2,893,318
Nov-10	462,950	82,590	12,988,264	2,317,106
Dec-10	536,712	95,749	16,679,737	2,975,665
Yearly Total	**6,085,126**	**1,085,586**	**168,549,991**	**30,069,318**

[1] Federal offshore production on the Alaska comes from the NorthStar facility, which produces from a unitized set of State and Federal Leases. Consequently, there is a State/Federal sharing allocation for crude oil and natural gas from Northstar. The current federal sharing allocation is 17.84%.

8.3 Public Use in the Arctic

8.3.1 Subsistence Use in the Arctic

Despite its size, the Alaskan Arctic is very sparsely populated.[30] Approximately 24,000 people live in its nearly 150,000 square miles, mainly in indigenous Iñupiat communities. About half the population lives in one of the three population centers of Barrow, on the Beaufort Sea; Kotzebue, on the Chukchi Sea; and Nome, on the Bering Strait. The remaining residents live in small villages of less than 1,000, scattered along the North Slope (Howe et al, 2011). The harsh Arctic climate and the difficulty of physically accessing the North Slope limit recreational public use in the Arctic. Most of the public use in the Arctic is among small subsistence communities along the coasts.

Native communities along the coasts of the Chukchi and Beaufort Seas rely on subsistence use, given their remoteness. Marine mammals such as baleen and toothed whales, ice seals, walruses, and polar bears are harvested by subsistence hunters, and make up a substantial proportion of many communities' annual diets. Based on an ADA-commissioned survey, 26 percent of respondents in the Arctic region rely on subsistence for at least half of their food supply. For another 27 percent, subsistence accounts for 25 to 50 percent of their food supply (McDowell Group, 2009).

Among the Iñupiat, subsistence activities hold a very high cultural value, and form a key component of cultural identity in addition to being an important link to the market economy. In northern Alaska, community relationships depend on the sharing and trading of natural

[30] The information in this section is mainly adapted from U.S. Geological Survey (USGS), 2011.

resources. A catastrophic event in the Arctic, at any time of year, could seriously damage this way of life (USGS, 2011).

Recreational fishing in the Beaufort Sea is limited, and focused mostly on the Seward Peninsula. Some recreational fishermen are nonresidents, who visit primarily in the summer. However, North Slope oilfield workers account for most of the recreational fishing in the Arctic (Conoco Phillips, 2005).

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The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Bureau of Ocean Energy Management Mission

The Bureau of Ocean Energy Management (BOEM) manages the exploration and development of the nation's offshore resources. It seeks to appropriately balance economic development, energy independence, and environmental protection through oil and gas leases, renewable energy development and environmental reviews and studies.