

Oceans Under the Gun: Living Seas or Drilling Seas?



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Executive Summary

In the long debate about outer continental shelf (OCS) drilling, policy makers and the public have typically focused on how much more oil or natural gas would be produced, how much more tax revenue would be collected and how many new jobs would be created if the nation expanded areas available for drilling. One set of issues, a critical set from the standpoint of healthy oceans, that has largely been ignored is the marine resources and sustainable activities that would be subjected to potential harm from new offshore drilling. For the first time, this report collects comprehensive information about what's at risk in the ocean and on our precious coasts should offshore drilling be expanded to areas like the eastern Gulf of Mexico, the Atlantic Ocean or the Pacific coast.

The report includes an overview of the marine and coastal environment in each Minerals Management Service (MMS) planning area including special marine ecosystems, unique coastal places and parks, extraordinary marine life and the value of coastal recreation and fishing (commercial and recreational) for each state within the MMS region. For each MMS planning region, the report compares the annual value of sustainable activities like tourism and fishing to the value of estimated oil and natural gas resources in the region.

Table 1
Annual Value of Sustainable Ocean Activities versus Oil and Gas Extraction by Region (Annual Value in \$Billions)

Planning Area	Sustainable Activities*	Nonrenewable Oil and Gas Extraction**	Ratio of Sustainable Dollars to Oil & Gas Value
North Atlantic (ME, NH, MA, RI, CT, NY, NJ)	\$61.2	\$5.1	12
Mid-Atlantic (DE, MD, VA, NC)	\$13.6	\$3.7	3.7
South Atlantic (SC, GA, FL east)	\$25.0	\$1.2	20.8
Eastern Gulf (FL west)	\$14.4	\$10.1	1.4
West & Central Gulf (AL, MS, LA, TX)	\$17.4	\$120.7	0.14
Pacific Coast (CA, OR, WA)	\$65.5	\$23.1	2.8
Total	\$197.1	\$163.9	NA

* Annual Value of Coastal County Hospitality Industry, Commercial Fishing and Recreational Saltwater Fishing from Appendix 1. No economic multiplier effect added to coastal county tourism or commercial fishing

** Annual Value of Estimated Oil and Natural Gas using MMS estimates and spring 2009 prices. Assumes even production over 25 year average field life without discounting cash flow.

Note: See Appendix 1 for State by State values for coastal tourism, commercial fishing and recreational fishing.

The table above clearly shows that for most planning regions other than the Central and Western Gulf of Mexico, the annual economic value of sustainable activities like

coastal recreation and fishing, which depend on clean water and clean beaches, is somewhat larger, sometimes by an order of magnitude, than the estimated annual value of oil and gas production from that region.

Specifically, the annual value of sustainable activities is roughly between 1.5 to 20 times larger than the value of oil and gas production for each region with the exception of parts of the Gulf of Mexico where approximately 20% of U.S. oil and gas is produced. In the Eastern Gulf of Mexico, the most hotly contested area for new drilling, sustainable businesses and jobs generate almost one and a half times (140%) the value that new oil and gas drilling would.

What is the significance of this comparison? Simply this: since, oil and gas exploration and production continue to be dirty and dangerous activities which pollute the ocean, industrialize the coast and degrade estuary ecosystems like Louisiana's, good economic policy should tilt in favor of sustainable uses of the ocean rather than the extraction of oil and gas because sustainable uses yield more economic and environmental benefits. Good energy and climate change policy would also favor the use of oceans for renewable wind and wave energy, not oil and gas production.

Recent reports on blue carbon, that is, the ability of the oceans and certain coastal ecosystems to fix atmospheric carbon and store it for very long periods of time as long as they are not degraded, emphasize the global importance of healthy oceans and preserving marshes, mangroves, sea grasses and other estuarine environments.¹ Our estimates of the value of coastal dependent businesses obviously do not include the value of the ecosystems services that these places provide. If calculated and added in, the ratio of sustainable activity to oil and gas value would be even more lopsided.

While not the detailed subject of this report, numerous reports detail damages from oil and gas exploration, drilling, production and refining². These activities are not compatible with healthy oceans, beaches or coasts. Catastrophic oil spills from platforms, pipelines, tankers/barges and from onshore facilities occur often enough to raise grave concerns.



Oil platform (Montara) off NW Australia started to spill oil and gas on August 21, 2009. It is still leaking two months later, up to 2,000-3,000 barrels per day, and now totals almost one half the size of the Exxon Valdez spill. At peak, the spill covered 9,000 square miles, the size of Maryland or Vermont. Damage to marine mammals, sea turtles and fish has been seen. Fishing and seaweed farming communities several hundred miles away in Indonesia report damage and illnesses from oil and oiled fish.

Credit: Annabelle Sandes, World Wildlife Fund

Chronic pollution from produced water, the water that is often brought up with oil and gas, and dumped into the ocean is also a problem. Drilling itself releases toxic

drilling mud into the marine environment. Oil and gas exploration requires seismic surveys of tens of millions of acres of ocean using very high sound levels that hurt fish and marine mammals. If we wish to preserve sustainable activities like coastal recreation and fishing and the economic value these activities produce, we must then keep the nonrenewable activities like oil and gas production out of new areas of the ocean.

Special areas of the ocean and specific unique marine wildlife that would be threatened by the expansion of offshore drilling are presented in each chapter of the report and summarized in the table below. Generally speaking, drilling threatens coastal beaches, beach communities and estuaries because of the risk of oil spills. Crude oil is difficult or impossible to clean up in many coastal environments, especially if it gets into sandy, muddy or marshy areas. Offshore oil requires onshore infrastructure for pipelines, tanks, processing and support facilities. These are often sited in low lying coastal estuaries that industrialize the coast.

Table 2
Special Places and Wildlife

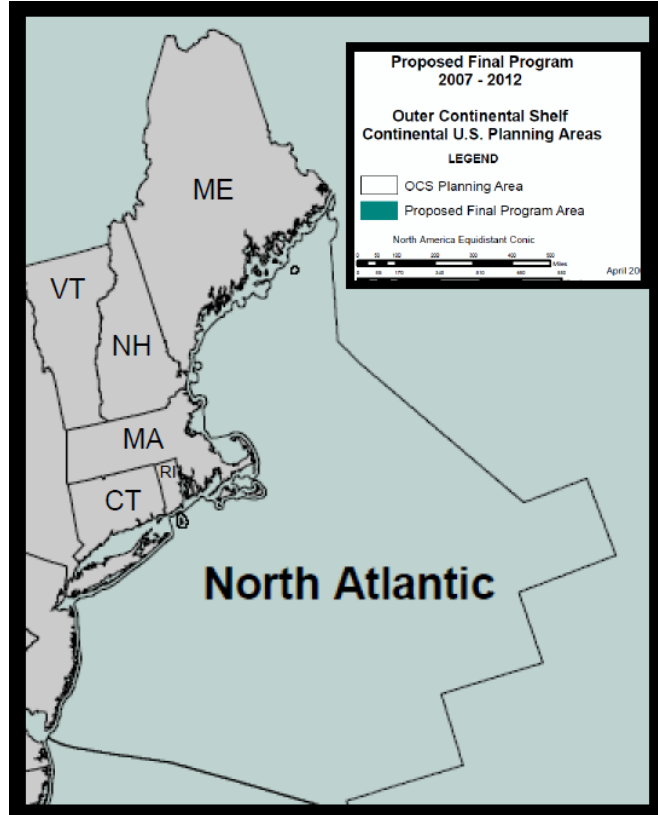
MMS Planning Region	Examples of Special Places	Examples of Unique Wildlife
North Atlantic	Gulf of Maine, Georges Bank, Cape Cod, Stellwagen Bank Marine Sanctuary, Acadia National Park, Narragansett Bay, Long Island beaches, New Jersey beaches, various submarine canyons and seamounts.	Northern right whale, endangered sea turtles, endangered shore birds, deep sea corals
Mid-Atlantic	Nine major submarine canyons, Chesapeake Bay, Cape Hatteras National Seashore and parks, deep coral reefs, numerous coastal wildlife refuges like Chincoteague and Bombay Hook, Delaware beaches, Maryland beaches, North Carolina beaches on Cape Hatteras.	Northern right whale, seasonal migration path for numerous other whales and dolphins, endangered sea turtles.
South Atlantic	South Carolina and Georgia sea islands such as St. Simons, Jekyll, Tybee, Hilton Head, Edisto, Cumberland Island, etc.. Sapelo Island National Estuarine Research Reserve. Northeast Florida Guana National Estuarine Research Reserve and State Aquatic Preserve. Beaches on the Atlantic coast of Florida. Eight national parks in Florida. Blake Plateau coral reefs, Oculina Banks and others with deep corals. Florida Keys National Marine Sanctuary.	Sea turtle nesting, northern right whale calving, manatees,

MMS Planning Region	Examples of Special Places	Examples of Unique Wildlife
Gulf of Mexico	Numerous underwater banks like the Flower Garden Banks National Marine Sanctuary, Pulley Ridge and others. Mississippi submarine canyon, Dry Tortugas National Park and Ecological Reserve, Big Bend Sea Grass Aquatic Preserve and many beach communities in MS, AL and FL.	Threatened bluefin tuna, endangered sea turtles, several species of endangered whales.
Pacific Coast	Olympic Coast, Gulf of Farallones, Cordell Bank, Monterey Bay and Channel Islands National Marine Sanctuaries. Several national estuarine research reserves and coastal parks like Pt. Reyes National Park.	Killer whales, California salmon, nesting seabirds, sea otters, seasonal populations of migrating whales such as blue whales.



North Atlantic

The North Atlantic leasing area includes the Gulf of Maine and Georges Bank, two of the most biologically productive areas in the world. At the junction of Polar and Sub-Tropical conditions, racing currents and constant upwellings supply cold, oxygen and nutrient-rich water to the Gulf of Maine and Georges Bank.³ Variations of water stratification, wind and fresh water inflow affect the transport and distribution of zooplankton, larvae, spores (and potentially harmful contaminants) within the area.⁴ In the event of an offshore oil spill, these same current circulation patterns would facilitate disaster for wildlife, ecological processes and the communities that live along the New England coasts, particularly those along the coast of Massachusetts Bay and Cape Cod Bay.



Also contained in the North Atlantic leasing area is the New York-New Jersey Harbor Bight, which includes more than 240 miles of sandy beach extending from Montauk on Long Island to Cape May, New Jersey. Long famous for tourism, the Jersey Shore is lined with famous boardwalks such as Atlantic City and Belmar, and beautiful beaches like Sandy Hook. The waters and estuaries of the bight are home to a diversity of fish, shellfish, and birds migrating along the Atlantic Flyway.



Special Places

While certain areas, such as the Stellwagen Bank National Marine Sanctuary, remain protected from drilling within their boundaries, the turbulent nature of the North Atlantic waters means that these special places are still in harm's way. Located 25 nautical miles from Boston, Stellwagen Bank Sanctuary supports over 575 different species, from colorful sea anemones and bubblegum corals to endangered humpback and right whales to commercially important species such as lobster and cod. Nearby, Cashes Ledge boasts one of the world's deepest and biggest underwater kelp forests, which serves as a nursery and home for a wealth of fish and wildlife, including a variety of cold water deep sea corals.

Also at risk from oil spills and steady industrial pollution are special places with a variety of designations. Three National Estuarine Research Reserves, encompassing more than 5000 acres of marine habitat, are located in the North Atlantic. National Wildlife Refuges include the Rachel Carson, Moosehorn, and Petit Manan in Maine, the Great Bay in New Hampshire, and the Parker River, Monomoy and Great Meadows in Massachusetts. Two highlights of the National Park System are the Cape Cod National Seashore and Acadia National Park.

Several remarkable canyons cut into the continental slope of New England and provide important refuges for deep sea fish and invertebrates. Many of these canyons are located on Georges Bank, an underwater plateau on the edge of the Gulf of Maine, while the other canyons are located in the Mid-Atlantic region. Georges Bank and nearby areas support the largest (by dollar value) commercial fisheries in the U.S. which in turn sustain a number of important fishing towns throughout New England like New Bedford, MA; Pt. Judith, RI; and Stonington, ME.

The New England Fishery Management Council officially recognized the importance of fourteen North Atlantic canyons in June 2007 by naming them as "Habitat Areas of Particular Concern" (HAPC) due to the abundance of long-lived deep-sea corals, soft corals, sea fans and sponges. This suite of canyons includes Lydonia, Oceanographer, Toms, Hendrickson, Heezen, Gilbert, Alvin, Atlantis, Hudson, Hydrographer, and Veatch Canyons.⁵

Off the New England coast, a chain of more than 30 seamounts called the New England Seamount Chain is home to many rare and endemic species. Seamounts are drowned extinct volcanoes under the sea which provide important habitats where deep sea invertebrates and fish can thrive. Four seamounts from the New England Seamount Chain are located in the 200 mile limit, and two of those have been designated as HAPCs. All four seamounts provide important habitat, prey, spawning grounds, and nurseries for diverse ocean life and are a vital link in the ocean community.⁶

Bear Seamount is the oldest seamount in the chain, but the closest to the coast. When explored by a deep sea submersible in 2000 and then again in 2002, a total of 214 invertebrates and 203 fishes were observed. Retriever Seamount has been found to provide habitat for sponges, corals, sea spiders, crabs, and other invertebrates which may attract larger animals such as fish and whales. Physalia Seamount's close proximity to Bear Seamount has led researchers to believe that it may provide a stepping stone for individuals on the continental shelf moving between shelf and slope environments. Mytilus Seamount has not been explored as thoroughly as its counterparts in the New England Seamount Chain, but it is thought to house similar habitat and diversity. Bear and Retriever seamounts have been designated as HAPCs by the New England Fisheries Management Council.

False boarfish are one type of fish that can be found on the New England seamounts. Their diamond shape and large eyes stare out into the deep darkness around the seamounts. False boarfish are long lived and take at least fourteen years to double

their population, and are just one of a myriad of fragile species in the North Atlantic.



Unique Wildlife

Contained in these protected habitats are several endangered species, including the North Atlantic right whale, one of the rarest creatures on earth. The National Marine Fisheries Service (NMFS) designated Cape Cod Bay and the Great South Channel as critical habitat for the North Atlantic right whale, whose population is estimated at a mere 350 individuals. In late 2008 NOAA's whale research team discovered unknown wintering grounds for North Atlantic right whales in the area known as Jordan Basin, about 70 miles south of Bar Harbor, Maine. Finding an aggregation of right whales in this area indicates its special importance for wintering males.⁷

Several species of endangered sea turtle (the leatherback, Kemp's Ridley and hawksbill) swim the North Atlantic alongside endangered fish such as the Atlantic salmon and Atlantic wolffish.⁸ The beaches of the North Atlantic also serve as critical nesting sites for several species of endangered birds, such as the piping plover and the roseate tern. A variety of cold water deep sea corals also thrive in the region.

In the Northeast United States, there are at least 25 different species of both hard and soft deep sea coral. These coral are long-lived and fragile, making them vulnerable to the toxic effects of oil. Although little is known about even the most abundant deep sea coral in New England, it is clear they are important animals in the deep sea ecosystem; providing shelter, food, and spawning grounds.

Deep sea coral are some of the most remarkable creatures on earth; flourishing in areas mostly devoid of light and supporting diverse ecosystems of the deep. Not only do they provide important habitat for deep sea fish and invertebrates, but they also contribute to the pool of genetic diversity and potential innovation for humans in the treatment of medical conditions.

Oil and gas exploration and drilling could pose serious threats to corals and other fauna unable to avoid the area. These activities can directly crush and damage these creatures, and can affect their living conditions by increasing the amount of sand and grit in the water and altering essential currents and nutrient flows.⁹ Drilling muds and cuttings from oil and gas exploration can be toxic to corals, and are known to cause death and alter feeding behavior in shallow-water varieties,¹⁰ although the effects on deep water corals are unknown. Studies have shown that the presence of drilling muds can also inhibit the settlement of invertebrate larvae.¹¹ As with other activities, such as fishing, drilling wastes may pose a more serious problem in the deep sea than in shallow waters due to lower resistance among deep sea communities, as well as slower recovery rates.¹²



Fisheries

Perhaps the most culturally and economically significant fishing ground in the North Atlantic is Georges Bank, a massive underwater plateau that forms the boundary between the Gulf of Maine and the Atlantic Ocean. The cold, nutrient-rich Labrador current meets the warm Gulf Stream in the shallow water of Georges Bank, creating ideal breeding and feeding conditions for fish and shellfish, in particular cod, haddock, herring, flounder, lobster, scallops, and clams.¹³ These fisheries gave rise to some of the nation's most iconic port cities, such as Portland, Maine; Portsmouth, New Hampshire; and Gloucester, Boston, New Bedford and Provincetown in Massachusetts. In addition to their cultural significance, North Atlantic fisheries also have tremendous economic value. In 2006, the states in the North Atlantic planning region hauled in close to 700 million pounds of fish and shellfish worth over \$1 billion dollars on the dock.¹⁴ New Bedford, MA is the largest fishery port in the U.S. by dollar value landed exceeding the busy Alaska ports. New Jersey is not often thought of as an important state for commercial fishing, yet four ports in New Jersey are among the top 50 ports nationwide in terms of the value of fish-shellfish landed: Cape May-Wildwood (#4), Atlantic City (#29), Long Beach-Barneget (#34) and Point Pleasant (#38).¹⁵



Energy and the Economy

The North Atlantic planning area contains a small amount of oil and natural gas resources relative to other areas and total oil and gas found in the OCS. The planning area is estimated to contain (i.e., undiscovered economically recoverable resources) approximately 1.33 billion barrels of oil and 7.32 trillion cubic feet of natural gas at recent prices, representing only 3% and 4% respectively of those resources on the total OCS.^{16&17} At current usage and recent prices, the natural gas and oil economically available for recovery from the North Atlantic could supply the nation with two months of oil use and four months of natural gas use for a total resource value of \$127 billion.^{18&19}

Offshore wind power represents a very significant energy resource in the North Atlantic. The National Renewable Energy Laboratory, operated by the United States Department of Energy, estimates that the North Atlantic region has 59 gigawatts of offshore wind power potential in shallow waters (less than 100 feet deep) and another 128 gigawatts in deeper water (100-200 feet deep), compared to 85 GW of currently installed electrical capacity in the region.²⁰ Offshore wind farms in shallow water off the North Atlantic planning area could supply 5 % of the current total national generating capacity and 66% of the region's current electric capacity.^{21&22}

Comparing the annual value of coastal tourism and fishing in the North Atlantic to the oil and gas that might be recovered over a 25-year period from this planning area, shows that just two years of sustainable use of the North Atlantic Ocean almost exceeds whatever oil and natural gas resources may be there. On an annual basis the ratio of sustainable value generated to potential oil and gas is 12 to 1 (see table

1). On a purely economic basis, without counting the renewable wind energy that could be harvested from this part of the ocean, it would be much better to use the North Atlantic Ocean sustainably.

Table 3

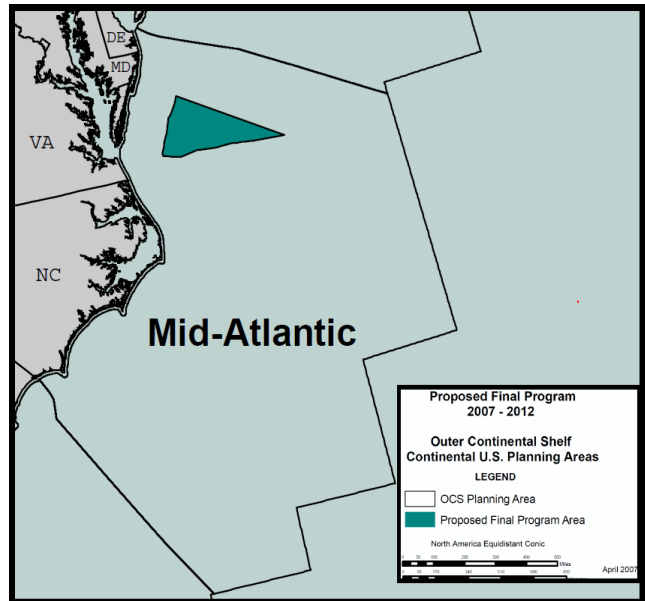
Value of Coastal Dependent Business in the North Atlantic Area	
Coastal Tourism (2007)	\$56.83 B ²³
Commercial Fishing (2006)	\$1.15 B ²⁴
Recreational Fishing (2006)	\$3.12 B ²⁵
Total	\$61.15 Billion

Note: See Appendix 1 for State by State values for coastal tourism, commercial fishing and recreational fishing.



Mid-Atlantic

The Mid-Atlantic region supports a robust fishing and tourism industry, hundreds of miles of beaches and marsh environments and important ocean ecosystems. Just like on land, certain areas of the ocean support migration corridors for fish, marine mammals, sea turtles and sea birds. For much of the Mid Atlantic, there is a coastal corridor extending out 20 miles from shore in which animals travel. Another corridor, farther offshore at the edge of the continental shelf break and slope, provides food for a variety of endangered sea turtles and marine mammals. There are also several hotspots of marine biodiversity and unusual productivity off the Mid Atlantic caused by ocean currents, the structure of the seafloor, the presence of submarine canyons and other special characteristics. These include the coastal waters off North Carolina, near Cape Hatteras, and the mouth of the Chesapeake Bay and Delaware Bays.



Special Places

The Mid-Atlantic leasing area contains 4 major submarine canyons: Norfolk, Washington, Baltimore and Wilmington. These canyons, often tens of miles long and several miles wide at their mouth, are characterized by the steep slopes and varied seafloor. Having bottoms and sides composed of different materials (e.g., boulders, rocks, pebbles, mud, clay, etc.) provides many different habitats for diverse inhabitants and high biological productivity.²⁶

Off the coast of Cape Hatteras, NC, a unique set of conditions exists which attracts all forms of marine wildlife. The nearby Gulf Stream sweeps in floating clusters of *Sargassum* (seaweed) which provide refuge for hatchling sea turtles and a wide array of fish. Dense populations of small prey fish in the *Sargassum* mats attract larger open ocean predators to the area. Seasonal migrations of a variety of whales, turtles, fish, seabirds, and other marine wildlife also occurs along the Gulf Stream, bringing seasonally high concentrations of several endangered species and many commercially important species to the region.

Live coral colonies have been observed off the coast of North Carolina since the 1960s. Over 200 coral mounds, some nearly 500 feet in height, exist in this area alone. More recently, scientists have explored three reef complexes in the area. These reefs, including the Cape Fear and Cape Lookout Banks occur at depths of over 1,200 feet on the western edge of the Blake Plateau and are several hundred feet tall.²⁷

These are the northernmost deep coral reefs in the eastern U.S. As the boundary of a significant marine region, they hold a unique mix of living resources that does not occur anywhere else. They appear to be different from more southerly occurring deep reefs and include some of the best developed *Lophelia pertusa* (a hard, white reef building coral) reefs ever discovered along the east coast.

The Cape Fear Banks rise more than 200 feet and include some of the most rugged habitat in the area. These Banks are the site of the greatest abundance of large fish off the coast of North Carolina. This is the only area where wreckfish have been observed off this state.

The Cape Lookout reef contain the most extensive coral mounds off of North Carolina. The main mound of this reef stretches a distance of approximately 3,280 feet along the sea floor. More than 54 species of fish have been observed on the Cape Lookout Banks. Many of the species identified were found to rarely occur off the reefs, if at all. Some of the most common species identified on these reefs include red bream, roughly, codling, rattail, and hake.

Another sensitive ecosystem in the Mid-Atlantic is the Chesapeake Bay, the largest estuary in the United States. The population of blue crabs in the Chesapeake Bay depends on the success of a larval crab stage that floats from the mouth of the Bay as far out to 50-60 miles offshore. Here, tiny crab larvae mature for several weeks before migrating back into the Bay. Should the vulnerable larvae encounter spilled oil or toxic materials from drilling, the recovering population of crabs in the Bay could be jeopardized.

On the coast itself, there are iconic beaches, sensitive coastal bays and marshes where it is extremely difficult if not impossible to clean up oil spills. Once spilled, oil tends to persist for long periods of time in sandy or muddy sediments and only slowly breaks down. Studies have shown that the presence of oil can affect the growth and health of wildlife 30 years after a spill.²⁸

Federal coastal parks in the Mid-Atlantic include Bombay Hook National Wildlife Refuge in Delaware, Assateague Island National Seashore in Maryland, Chincoteague National Wildlife Refuge in Virginia, and Cape Hatteras and Cape Lookout National Seashores in North Carolina. Also vulnerable are beach communities such as Rehoboth and Bethany Beaches in Delaware, Ocean City in Maryland, Virginia Beach in Virginia and Nags Head and Kitty Hawk in North Carolina.



Unique Wildlife

As in the North Atlantic, the critically endangered right whale finds seasonal habitat in the waters of the Mid Atlantic. During their yearly migration from Cape Cod to the Georgia-Florida border, right whales, already threatened by busy shipping lanes, travel the corridor. Many other whale species seasonally inhabit the offshore areas known as the continental shelf break and the upper continental slope, such as

sperm, beaked, pilot, sei, and fin whales. Several species of dolphin, including bottlenose, striped, spotted, common, and Rizzo's occupy various regions of the Mid Atlantic as well.²⁹

Also found in (relatively) high numbers from Cape May, NJ to Cape Hatteras are several species of endangered sea turtle, including the loggerhead, leatherback and Kemp's ridley. Sea turtles in the region are already threatened by longline fishing vessels and loss of nesting habitat. For sea turtles, drilling in this area would be adding fuel the fire.



Many ecologically and commercially important species of migratory fish can be found in Mid Atlantic waters, including menhaden, striped bass, summer flounder, bluefish, bay anchovy, shad, sturgeon and sharks.³⁰ Many species spawn offshore where ocean currents carry the larvae to inshore nursery areas. Other species spawn in this region's bays and estuaries.

Maryland's state crustacean, the blue crab, has enormous cultural and economic value in this region. In 2008, Delaware, Maryland, Virginia and North Carolina combined hauled in almost 90 million pounds of blue crabs.³¹ Mid-Atlantic fisheries also catch millions of pounds of menhaden, croaker, flounder, striped bass and scallops, to name a few. In 2008, the value of this fish and shellfish was over \$300 million dollars in sales right off the boat. Virginia has two ports in the top 50 nationally: Hampton Roads (#6) and Reedville (#30).³²



The Mid-Atlantic planning area contains a small amount of oil and natural gas resources relative to deposits in other areas and total oil and gas resources in the OCS. The planning area is estimated to contain (i.e., undiscovered economically recoverable resources) approximately 0.94 billion barrels of oil and 5.54 trillion cubic feet of natural gas at recent prices, representing less than 2% of oil and 3% of gas resources on the total OCS.³³ At recent prices³⁴ and usage, the oil and natural gas economically available for recovery from the Mid-Atlantic could supply the nation with less than two months of oil use³⁵ and three months of natural gas use³⁶ at a value of \$92 billion.

The Mid-Atlantic has the best marine offshore wind resource in shallow waters in the country. The National Renewable Energy Laboratory, operated by the United States Department of Energy, estimates that the Mid-Atlantic contains 166 gigawatts of offshore wind power potential in shallow waters (less than 100 feet) and 182 gigawatts in deeper water (100-200 feet) compared to 67 GW of currently installed electrical capacity in the region.³⁷ Wind farms off the Mid-Atlantic planning area could provide 15% of the current total national generating capacity or more than the entire electrical generating capacity of the Mid-Atlantic and North Atlantic states.³⁸

Table 4

Value of Coastal Dependent Business in the Mid-Atlantic Area	
Coastal Tourism (2007)	\$11.24 B ³⁹
Commercial Fishing (2006)	\$239 M ⁴⁰
Recreational Fishing (2006)	\$2.07B ⁴¹
Total	\$13.55 Billion

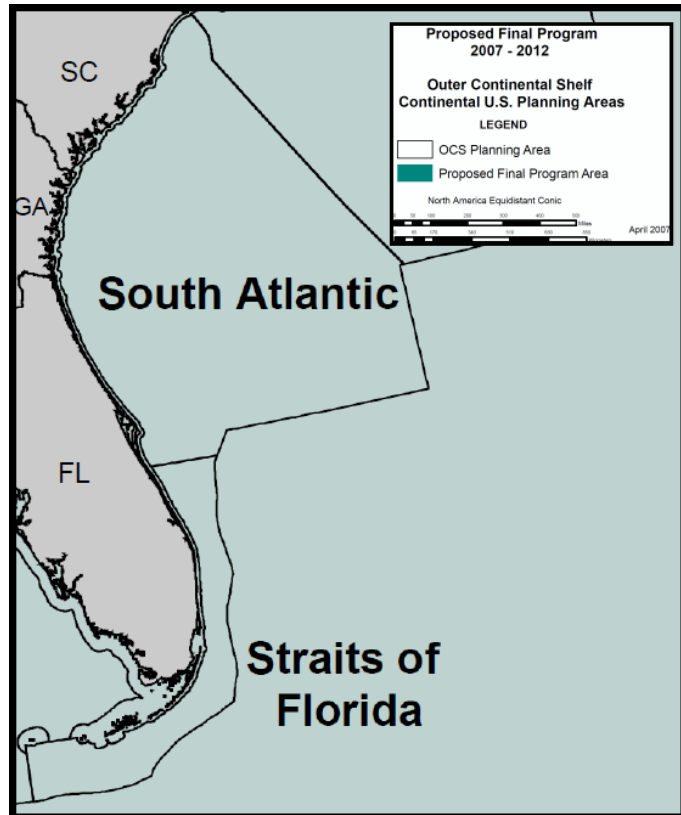
Note: See Appendix 1 for State by State values for coastal tourism, commercial fishing and recreational fishing.

The annual value of all coastal dependent business such as tourism and fishing in the Mid-Atlantic exceeds the annual value of oil and gas by a ratio of almost 4 to 1 (see Table 1). If you include the huge potential for renewable energy production off the Mid-Atlantic coast with other sustainable uses of the ocean, sustainable uses dwarf the value of nonrenewable fossil fuel potential. There is so much wind energy available in the shallow waters offshore that this area could generate enough to run everything that uses electricity in the Mid-Atlantic and North Atlantic states, an area from Maine to North Carolina with approximately 60 million people in 2008.



South Atlantic and Straits of Florida

Based on a measure of marine productivity used by the Department of the Interior, the South Atlantic is ranked first in terms of primary productivity among all of the planning areas.⁴² The South Atlantic and Straits of Florida areas have some of the largest and most intact areas of coastal estuaries of any planning area in the U.S. In the Southeast U.S., deep sea corals create oases of special habitat along the coast and are extremely vulnerable to pollution from oil spills. Several deep sea coral reefs have been identified by the South Atlantic Fishery Management Council as sensitive habitats worthy of protection from destructive fishing practices. The coral features designated for protection include (from north to south) Stetson Reef, Savannah, East Florida, Miami Terrace, and Pourtales Terrace.



Special Places

Beaches and Parks

The coastline of the South Atlantic is famous for its white sand beaches. South Carolina's coastline includes Charleston and Hilton Head Island, Cape Romaine Wildlife Refuge and four state parks: Myrtle Beach, Huntington Beach, Edisto, and Hunting Island. In Georgia, beaches include St. Simons Island, Jekyll Island, Tybee Island Beach and Cumberland National Seashore, where wild horses roam the beach. Of course Florida's east coast is lined with world famous beaches, including the tourist destinations of Cocoa Beach, Daytona, West Palm Beach, Ft. Lauderdale, Miami Beach and Biscayne Bay beaches.

Dotting Florida's Atlantic coast are eight national parks, including Canaveral National Seashore, Biscayne National Park, Everglades National Park and the Florida Keys National Marine Sanctuary. In addition, the State of Florida has set aside hundreds of thousands of acres of coastal aquatic preserves in more than one dozen areas along its east coast.⁴³

Corals:

Approximately 120 nautical miles off the coast of Charleston, South Carolina, Blake Plateau contains hundreds of coral pinnacles, including Stetson Reef. Over 200 coral mounds occupy this 2,383 square mile area. One of the tallest deep sea coral mounds, Stetson Peak, is estimated to be nearly 500 feet tall, one of the tallest *Lophelia* mounds identified globally. At least ten species of fish rely upon these reefs including red bream, roughy, codling, rattail and hake, as well as an abundance of brittle stars, sea urchins, sea anemones and soft corals.⁴⁴

Off the coast of Savannah, Georgia, a number of peaks occur along the Blake Plateau about 90 nautical miles offshore. These deep water *Lophelia* mounds are between 100 to 200 feet tall and are covered with fine sediment, dead coral fragments and thickets of coral, sponges and sea fans. Coral colonies measuring 12 to 20 inches in diameter cover approximately 10 percent of the sea floor in this area. The reef system supports large populations of massive sponges, sea fans and well over 10 different fish species. Some of the fish present on these reefs include swordfish, rattail fish, blackbelly rosefish and sharks.⁴⁵

Over 40,000 coral individuals are present in the East Florida region of the Straits of Florida and the Blake Plateau. Nearly 300 coral mounds from 50 to 500 feet in height have been found off Jacksonville alone. The coral mounds in this region can extend over one half mile in length. Live coral on some of these reefs was radiocarbon dated and found to be 700 years old; dead coral was found to be over 28,000 years old. These reefs are important to over twelve species of fish including blackbelly rosefish, chimaera, codling, goosefish, dogfish, hagfish, rattail, cutthroat eel, and wreckfish.⁴⁶

The Miami Terrace is off southeastern Florida and provides habitat for an array of marine life from commercially valuable grouper to intricate sponges. A rock ridge along the eastern edge of the terrace is topped with many hard and soft corals and sponges. *Lophelia* reefs also occur along the base of the terrace at depths of over 2,000 feet. Twenty fish species have been identified at this site, including dense aggregations of wreckfish, shortnose greeneyes, conger eel, red dory, blackbelly rosefish, codling, dogfish, rattail, skates, sharks and jacks.⁴⁷

The Pourtales Terrace parallels the Florida Keys for 132 miles and acts as important habitat covering over 1,000 square miles at depths of 600 to 1,400 feet. The peaks of some of these mounds are covered with thick layers of corals, along with dense and diverse communities of sponges, octocorals, and fish. Thirty species of fish have been identified at this site. Numerous sinkholes occur along the outer edge of the Terrace, the bottoms of which can be almost 2,000 feet deep and up to 2,000 feet in

diameter, making them some of the largest in the world. These sinkholes provide habitat for various hard and soft corals, sponges, anemones, urchins, starfish, crustaceans and gastropods.⁴⁸

Estuaries:

In South Carolina, the ACE Basin (Ashepoo, Combahee and South Edisto) containing over one-third-of-a-million acres, is one of the largest undeveloped estuaries on the East Coast and contains habitat for many endangered or threatened species, such as shortnose sturgeon, wood storks, loggerhead sea turtles and bald eagles.⁴⁹

The Sapelo Island National Estuarine Research Reserve, a 6,110-acre natural area, is on the fourth largest of Georgia's barrier sea islands. The Reserve was designated in 1976 and is made up of salt marshes, maritime forests and beach dune areas. The marshes of Sapelo Island National Estuarine Research Reserve provide food and nesting habitat for a variety of birds, mammals, and reptiles and are also the nursery ground for many economically important fish and shellfish.⁵⁰

In Northeast Florida, the Guana Tolomato Matanzas (GTM) National Estuarine Research Reserve encompasses approximately 55,000 acres of salt marsh and mangrove tidal wetlands, oyster bars, estuarine lagoons, upland habitat and offshore ocean. It contains the northern most extent of mangrove habitat on the east coast of the United States. The coastal waters of the GTM Reserve are important calving grounds for the endangered right whale. Manatees, wood storks, roseate spoonbills, bald eagles and peregrine falcons find refuge in the reserve.⁵¹



Unique Wildlife

The South Atlantic's waters and coastline provide habitat for many endangered, threatened and commercially important species. The beaches are famous nesting grounds for sea turtles, including loggerhead and leatherback turtles. green, Kemp's ridley, and hawksbill turtles can be found in the waters off Florida's Atlantic coast, although they don't often nest here. Recently, loggerhead populations in Florida have been dwindling, with an estimated 40% decline in nesting on the beaches of Southeastern Florida in the last decade. Loggerheads are considered threatened, while leatherback, green, hawksbill and Kemp's ridley are all listed as endangered species. Sea turtle populations in the South Atlantic are already under intense stress from industrial fishing (turtles are often caught as bycatch), nesting habitat destruction (beach development and artificial lighting), and pollution (turtles often ingest plastics, etc).

One of the rarest animals in the world, the North Atlantic right whale migrates from feeding grounds in the Gulf of Maine to give birth off of the Georgia - Florida border. The endangered manatee is also found primarily off the coast of Florida, although sometimes as far north as the Carolinas. Several other endangered whales, fish, corals, and birds live in the South Atlantic as well.



There is a rich variety of fish and shellfish with significant commercial value in the South Atlantic. Commercial species include: shrimp, flounder, croaker, blue crabs, mackerel, bluefish, snapper and oysters. On Florida’s east coast alone in 2008, more than 26 million pounds of finfish, shellfish, sponges, octopus and squid were landed. Both commercial and recreational fishing are big businesses in the South Atlantic. All species combined, commercial fisheries in the South Atlantic landed more than 46 million pounds of seafood in 2007 worth around \$70 million. ⁵²



Energy and the Economy

The South Atlantic planning area contains a small amount of oil and natural gas resources relative to other areas and total oil and gas on the OCS. At recent prices, the planning area is estimated to contain (i.e., undiscovered economically recoverable resources) approximately 0.31 billion barrels of oil and 1.69 trillion cubic feet of natural gas, representing less than 1% of those resources on the total OCS.⁵³ At recent prices⁵⁴ and usage⁵⁵, the natural gas and oil economically available for recovery from the South Atlantic could supply the nation with about 15 days of oil use and less than one month of natural gas use⁵⁶ with a value of \$29 billion.

In the South Atlantic region, offshore wind could provide a substantial amount of electricity from South Carolina to Florida. The National Renewable Energy Laboratory, operated by the United States Department of Energy, estimates that the South Atlantic Bight (roughly the same states) contains 28 gigawatts of offshore wind power potential in shallow waters (less than 100 feet deep) and 58 gigawatts in deeper water (100-200 feet deep), compared to 115 GW of currently installed electrical capacity in the region.⁵⁷ Wind farms off the South Atlantic planning area in shallow water would provide about 3% of the current total national generating capacity or all of South Carolina’s entire electric demand.⁵⁸

Table 5

Value of Coastal Dependent Business in the South Atlantic Area	
Coastal Tourism (2007)	\$21.26 B ⁵⁹
Commercial Fishing (2006)	\$70.5 M ⁶⁰
Recreational Fishing (2006)	\$3.64 B ⁶¹
Total	\$24.97 Billion

Note: See Appendix 1 for State by State values for coastal tourism, commercial fishing and recreational fishing.

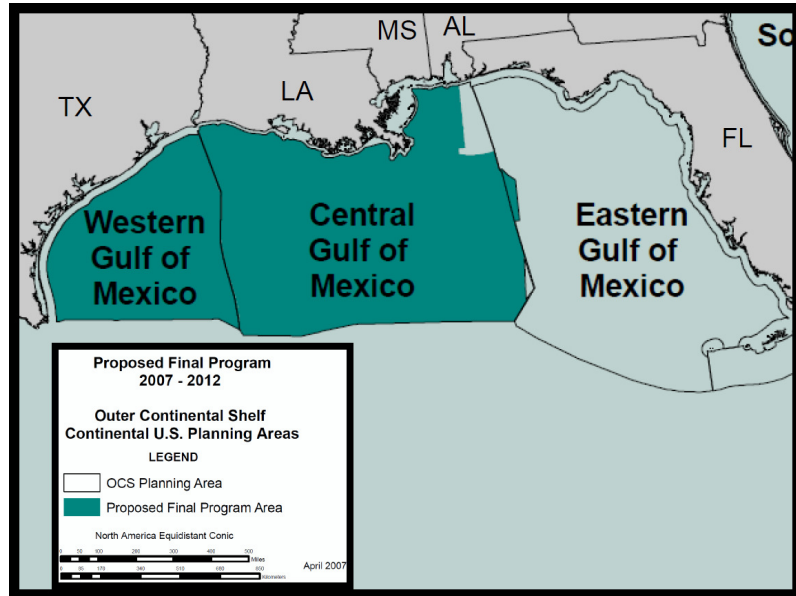
With a conservative sustainable annual value of nearly \$25 Billion, the economic benefits from coastal dependent businesses like tourism and fishing almost exceed the total value of oil and natural gas estimated to lie offshore. The annual value of sustainable coastal dependent businesses in the region exceeds the annual value of

oil and gas (\$1.1 Billion) by a ratio of almost 21 to 1 (see Table 1). Adding the potential benefits of electricity generated by offshore wind farms would make the comparison of sustainable economic activity tied to a clean ocean and coast versus unsustainable oil and gas extraction even more lopsided.



Gulf of Mexico

The ninth largest body of water in the world, the Gulf of Mexico contains half of the United States' wetlands.⁶² It houses a remarkable diversity of marine and coastal ecosystems, including marshes, coral reefs, mangroves, bays, estuaries, and tidal flats. The Gulf of Mexico is home to an abundance of remarkable creatures in shallow water and the



deep sea: from the surface where some of the world's last bluefin tuna spawn to the coral gardens where some shark species lay their eggs. Not only does the area have increasing fishing pressure and several depleted species, but it also has extensive oil and natural gas resources, threatening many of the habitats that make the Gulf so diverse. Special underwater structures in the Gulf include ridges, pinnacles, banks, mounds, canyons, and escarpments that provide important three dimensional formations which make ideal habitat. The submerged islands, deep canyons, and other topographic features of the seafloor host diverse ecological communities, including coral gardens and mussel gardens.⁶³

The Gulf of Mexico teems not only with wildlife, but people too, as the total population of the Gulf coast region was greater than 20.5 million in 2008. Residents and tourists alike flock to the Gulf of Mexico to take advantage of the abundant natural resources. In 2006, 28% of all U.S. marine recreational fishing trips were taken in the Gulf.



Special Places

The natural seafloor structures that lie underneath the Gulf of Mexico provide diverse habitats. Reef banks such as Sonnier Bank, Geyer Bank and Bright Bank formed about 160 million years ago as a result of salt layer deposits in the then-shallow sea. The organisms associated with the banks vary according to the depth of the physical features. The tops of the banks have well-developed reef communities at their crests while the bases often have fine sediments such as mud. An interesting feature of Bright Bank is a 'mud volcano' and hydrocarbon seeps.⁶⁴

Located about 110 miles south of the Texas/Louisiana border, The Flower Garden Banks National Marine Sanctuary includes the northern-most warm water, shallow

coral reefs in the continental United States. Amounting to more than 300 acres of protected reef, this bank is home to more than 23 species of coral, 250 invertebrates, 175 fishes, and 80 algae species.⁶⁵

Canyons are a major feature of the sea floor of the Gulf of Mexico. The cracks and crevices present in deep sea canyons provide a diversity of habitats for various species to survive. The Mississippi Canyon is the largest canyon in the Gulf of Mexico and is at least 3,000 feet deep. The mouth of the canyon is 30 miles wide and the canyon itself is over 90 miles long. This canyon is home to mussel beds, brine seeps, bacterial mats, and tubeworms. Additionally, the deep sea coral habitats of this canyon provide a place for egg-laying sharks to lay their eggs.⁶⁶

Ridges are collections of drowned mountains that together form ideal habitats for a variety of sea creatures. In the Gulf of Mexico, ridges are home to both deep-water and shallow-water corals. Additionally, many tropical fish inhabit these ridges. These fish are able to survive here due to the confluence of warm clear ocean currents and nutrient rich upwellings of colder water. Pulley Ridge is the deepest known coral reef in the continental United States. It is between 200 and 350 feet below the water's surface, 155 miles west of Cape Sable, Florida, and extends for over 60 miles.

Off the shores of Mississippi and Alabama, on the edge of the continental shelf, an area of steep-sided, drowned deep-sea reefs called the Pinnacles can be found. These formations concentrate high biodiversity near the shelf edge and are important habitat and spawning sites for commercially fished species in the Gulf of Mexico. Other areas that have been identified in the Gulf of Mexico as special underwater habitats include: the South Texas Banks, North Texas-Louisiana Banks, Madison Swanson, Florida Middle Grounds and Steamboat Lumps

Wetland ecosystems such as marshes, tidal flats, bays, sea grass beds and mangrove forests abound along the Gulf's shores. They serve as: bird nesting and feeding sites and spawning and nursery areas for many commercially important fish species. They trap nutrients and sediment from rivers, mitigating the seasonal dead zone at the mouth of the Mississippi River to some degree. Significantly, they also trap carbon to reduce global warming pollution. During severe storms they also serve to protect inland areas from wind and storm surges.⁶⁷

Special areas of protected coastal habitat in the Gulf include: Padre Island National Seashore in Texas, Gulf Islands National Seashore in Mississippi, the Everglades National Park in Florida, almost 20 Florida State Aquatic Preserves protecting hundreds of thousands of acres along the Gulf coast, two National Estuarine Research Reserves (Apalachicola Bay and Rookery Bay), and the Florida Keys National Marine Sanctuary with its Tortugas Ecological Reserve.



Unique Wildlife

In addition to corals, the Gulf of Mexico is home to an incredible diversity of marine animals, many of which are endangered or threatened. Bluefin tuna are among the

most impressive fish in our oceans, and a population of tuna spawn in the Gulf of Mexico. They can reach speeds of 45 mph, undertake trans-Atlantic migrations of up to 4,800 miles, and adults can grow to 12 feet in length and weigh 1,500 pounds. The population of western Atlantic bluefin tuna remains at an all-time low, despite plans put in place for their rebuilding. According to the International Commission for the Conservation of Atlantic Tuna (ICCAT), the spawning population of western bluefin tuna has decreased by 75 percent in the last three decades. A 125,000 square mile area in the Gulf of Mexico has been identified as critical spawning habitat for bluefin tuna.⁶⁸

Another group of endangered animals, sea turtles, also inhabit the Gulf of Mexico. Off the coast of Texas, Padre Island is key nesting habitat for Kemp's Ridley turtles, the smallest species of sea turtle. Loggerhead, leatherback, green, and hawksbill turtles can also be found in the Gulf, and their dwindling populations have recently gained them protection from long-line fisheries in the region. Both the Gulf of Mexico Fisheries Management Council and the National Oceanic and Atmospheric Administration (NOAA) have issued emergency closures of long-line fisheries in the area.

Of the 28 species of marine mammals in the Gulf of Mexico, seven are endangered: sperm, sei, fin, blue, humpback and North Atlantic right whales and the Florida manatee. Recently, killer whales have been found in the Gulf of Mexico as well. Several species of fish are also in trouble, including the endangered smalltooth sawfish, the threatened gulf sturgeon, and certain sharks and grouper are "species of concern." Many highly endangered birds such as the whooping crane, piping plover, brown pelican, peregrine falcon and even the bald eagle all have extensive habitat here.⁶⁹



Fisheries

In 2008, commercial fisheries in the Gulf of Mexico caught than 1.3 billion pounds of seafood worth \$659 million dollars, with menhaden accounting for almost 1 billion pounds and shrimp being the next largest catch.⁷⁰ Other major fisheries include blue crabs, oysters, spiny lobsters, and many species of finfish including grouper, snapper, tuna, and sharks. Eleven of the top 25 fishery ports in the U.S. are in the Gulf of Mexico. Recreational fishing is a huge business in the Gulf of Mexico accounting for almost \$6 billion of value and commercial fishing should become much more lucrative as depleted populations are rebuilt in coming decades.



Economic Impact

The entire Gulf of Mexico planning area, almost 160 million acres of ocean, contains an estimated 37.1 billion barrels of oil and 162.3 trillion cubic feet of natural gas.⁷¹ Comparing this estimated amount with total resources projected for the OCS, the entire Gulf of Mexico represents 71% of OCS oil and 83% of the total gas economically recoverable.

The Gulf of Mexico also has a significant amount of offshore wind resource available in shallow water off Texas. According to the National Renewable Energy Laboratory, the Gulf contains 12 gigawatts (GW) of offshore wind power potential in shallow water (less than 100 feet deep), and 55 GW in deeper water (100 – 200 feet).⁷² These areas, located off the east coast of Texas, could potentially power 66% of that state’s installed electrical capacity.⁷³

Eastern Gulf of Mexico (West Coast of Florida):

The Eastern Gulf of Mexico planning area, one of the three planning areas that makes up the entire Gulf (i.e., Western, Central and Eastern areas), consists of almost 65 million acres and lies off the west coast of Florida. MMS estimates that this area contains, in total, 3.03 billion barrels of oil and 10.97 trillion cubic feet of gas that are unleased, undiscovered and economically recoverable at recent prices.⁷⁴ This represents approximately 6% of the total endowment of oil and natural gas offshore. There are very few renewable wind resources available in the Eastern Gulf of Mexico, but someday we may be able to harvest energy from the huge amount of water traveling in the Florida Loop Current inside the Gulf and in the beginnings of the Gulfstream that lie off the southern tip of Florida. The sheer volume of water moving in the Gulfstream is astounding.

The annual value of sustainable, coastal dependent business on the west coast of Florida is \$14.4 Billion compared to an annual value for the oil and gas that might be found there of a little over \$10 Billion (see Table 1). The value of sustainable business is therefore almost one and one half times the oil and gas that might be there.

Table 6

Value of Coastal Dependent Business in the Gulf of Mexico Areas	
Coastal Tourism (2007)	\$25.36 B ⁷⁵
Commercial Fishing (2006)	\$674 M ⁷⁶
Recreational Fishing (2006)	\$5.79 B ⁷⁷
Total	\$31.82 Billion

Note: See Appendix 1 for State by State values for coastal tourism, commercial fishing and recreational fishing.



Pacific Coast

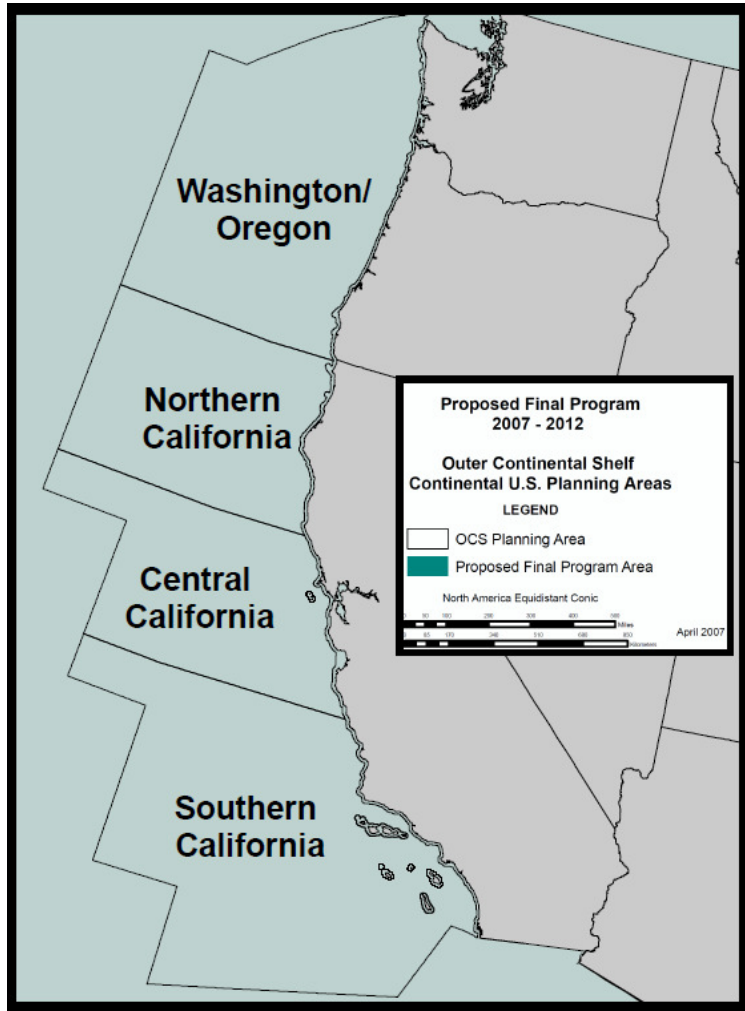
From the Puget Sound in Washington down to the Channel Islands in Southern California, the Pacific coast of the United States hosts a vast array of marine ecosystems and wildlife. Fishing has always been central to the economy, livelihood and culture of the U.S. Pacific coast. However, many of the fish stocks in this region suffer from habitat destruction, dams, pollution, overfishing and possibly climate change.



Special Places

On the northern coast of Washington, Puget Sound is home to 200 species of fish, 100 species of seabirds, thousands of species of invertebrates, and 26 species of marine mammals.⁷⁸ Nearby, the Olympic Coast National Marine Sanctuary (OCNMS) exemplifies the types of wildlife and habitat commonly found in the Pacific waters of the northwest United States. Twenty-nine species of marine mammals thrive in the OCNMS, including toothed and baleen whales, sea lions, sea otters, and harbor seals.⁷⁹ Seabirds of all shapes and sizes use the coastline as a migratory pathway. Although famous for salmon, the region's temperate waters, complex currents and frequent upwellings provide an ideal habitat for a variety of fish such as halibut, hake and herring.

Washington state is famous for its spectacular shores and rugged coastlines. Below the ocean's surface, the coral, sponges, and other colorful seafloor life off Washington are just as beautiful. For example, the OCNMS is home to corals, sponges, and other living seafloor habitats. In fact, this sanctuary is home to a rare discovery of *Lophelia pertusa*, a reef-forming deep-sea coral previously thought to exist only in the Atlantic Ocean. Even Puget Sound contains hydrocorals scattered throughout its various inlets and islands. These corals provide structure on the seafloor for feeding, shelter from predators, and a nursery for juveniles.⁸⁰



Oregon is home to a magnificent underwater environment, producing valuable fisheries and diverse seafloor habitats. Deep underwater canyons like Astoria Canyon where the Columbia River meets the ocean are home to a variety of coral and sponge habitats. Heceta Bank off the Oregon Coast is a hotspot for black corals. These complex habitats provide homes for commercially important species like rockfish, which are currently rebuilding from overfishing. Oregon is currently designating a small number of marine protected areas in state waters at the urging of the Governor and approval by the legislature.

Heading south, the coast of California hosts a long list of federally protected and internationally designated sanctuaries, reserves, wetlands and islands:

- Gulf of the Farallones National Marine Sanctuary
- Cordell Bank National Marine Sanctuary
- Monterey Bay National Marine Sanctuary
- Point Reyes National Seashore
- Elkhorn Slough National Estuarine Research Reserve
- San Francisco Bay Estuarine Research Reserve
- California Coast Ranges Biosphere Reserve
- Golden Gate Biosphere Reserve
- Bolinas Lagoon Wetland of International Importance
- Tomales Bay Wetland of International Importance
- Channel Islands National Park
- Channel Islands National Marine Sanctuary
- Tijuana River National Estuarine Research Reserve

Few people are aware that the continental shelf, slope, and canyons of California's ocean are home to a diversity deep sea corals. Like redwoods, California's deep sea corals can live to be hundreds to thousands of years old. Large corals like Hydrocorals, gorgonian corals, and black corals are found in high densities in the Channel Islands, Monterey Bay, the Gulf of the Farallones off San Francisco, and the continental slope off Northern California. Hydrocorals and gorgonian sea fans are commonly seen by divers in Southern California. Deep sea corals are but one type of organism that creates habitats for others. Other living 'structures' include sponges, kelp forests, anemones, tunicates, and crinoids. These provide shelter for a variety of sea life, including rockfish, crabs, lingcod, garibaldi, and many others.⁸¹

Scientists recently discovered a new species of deep-sea coral off the coast of Santa Barbara. They named the new species "Christmas tree coral" since it grows more than six feet tall and resembles pink, white, and red flocked Christmas trees. This discovery shows the importance of protecting areas that have not yet been trawled.



Unique Wildlife

Perhaps the most iconic animal in Washington's ocean is the killer whale, which was added to the list of endangered species in 2005. The population of Puget Sound killer whales is estimated to be a mere 89 today, perhaps due in part to the concurrent decline of salmon populations and toxic pollution. Killer whales rely on salmon as a major food source, but salmon populations have been in rapid decline as they lose habitat to coastal and wetland development.

The waters of the Pacific Northwest and northern California receive high runoff, especially from the Columbia River which drains a watershed of approximately 259,075 square miles. The input of fresh water creates a lens of lower salinity water and the input of nutrients stimulates the growth of algae, phytoplankton, and other rich marine life. The low salinities and low temperatures in the estuaries of northern California provide critical habitat to important species such as the Dungeness crab, Pacific herring, perch, and of course salmon. Smaller but ecologically vital forage fish such as surf smelt and sand lance provide critical food sources for marine mammals (including whales) and many species of seabird. The area hosts a number of important whale species including the largest mammal on earth, the blue whale, for parts of the year. The region has one of the highest concentrations of pelagic, or open ocean, seabirds along the entire U.S. coastline.

Central California is a biologically rich and diverse ecosystem. The only sea otter population south of Alaska on the Pacific coast lives along Big Sur and is listed as threatened under the federal Endangered Species Act. Sea turtles also feed here on a wide variety of jellyfish species. Additionally, Central California plays host to one of the world's largest concentrations of great white sharks. Harbor seals, northern elephant seals, Dall's and harbor porpoises, and Pacific white-sided dolphins are also found in significant numbers. Many whale species also abound including gray, humpback, and killer whales. Many of the same seabirds and migratory birds that exist in northern California are also found here. In fact, more than 50 percent of the birds migrating along the Pacific Flyway use the estuaries here for wintering.

In Southern California, perhaps the most productive habitats are the kelp beds which provide shelter and nourishment for many endangered fish species including bocaccio and other rockfish species as well as abalone. This area also provides critical rookery habitat for California sea lions as well as the Guadalupe fur seal. Several areas off of Baja, California, are thought to be some of the most important breeding and calving areas for the gray whale.



Fisheries

The commercial fisheries off of California, Oregon and Washington brought in a combined 831 million pounds of seafood in 2007 worth nearly \$500 million. Perhaps the most notable species in the region is salmon. Recently, Pacific salmon have been in sharp decline, and both the Federal and State governments have dedicated

significant funds to research and recovery efforts. Other important commercial species of the West Coast include squid, Dungeness crab, albacore tuna, sardines, anchovy, mackerel, sole, and Pacific hake, to name a few.



Energy and the Economy

California:

California's OCS contains a modest amount of oil and natural gas resources relative to other areas and total oil and gas resources on the OCS. The planning area is estimated to contain (i.e., undiscovered economically recoverable resources) approximately 7.95 billion barrels of oil and 11.66 trillion cubic feet of natural gas at recent prices. This represents about 15% of the oil and 6% of the gas compared to total OCS resources.⁸² At recent prices and usage, the natural gas and oil economically available from California's OCS could supply the nation with around thirteen months of oil use⁸³ and six months of natural gas use⁸⁴ for a value of \$548 billion.

California's OCS has a small amount of offshore wind resources in shallow waters and excellent wave energy potential. The National Renewable Energy Laboratory, operated by the United States Department of Energy, estimates that California's OCS contains 2 gigawatts of offshore wind power potential in shallow waters (less than 100 feet deep) and 5 gigawatts in deeper water (100-200 feet deep), compared to 64 GW of currently installed electrical capacity in the state.⁸⁵ Wind farms in California's OCS planning area would provide 4% of the state's electric supply.⁸⁶ The Electric Power Research Institute estimates the entire Pacific Coast contains 440,000,000 MWh of wave power potential annually⁸⁷ – or more electricity than Oregon, Washington and California combined currently generate.⁸⁸

Washington/Oregon:

The Washington/Oregon planning area contains a miniscule amount of oil and natural gas resources relative to other areas and total oil and gas on the OCS. The planning area is estimated to contain (i.e., undiscovered economically recoverable resource) approximately 0.3 billion barrels of oil and 1.28 trillion cubic feet of natural gas at recent price estimates, representing about 0.6% of total OCS resources for both oil and gas.⁸⁹ At recent prices and usage, the oil and natural gas economically available from the Washington/Oregon planning area could supply the nation with 15 days of oil⁹⁰ and 20 days of natural gas⁹¹ with a value of \$26 billion.

The Washington/Oregon planning area has moderate offshore wind resource in shallow waters and excellent wave conditions. The National Renewable Energy Laboratory, operated by the United States Department of Energy, estimates that the area contains 8 gigawatts of offshore wind power potential in shallow waters (less than 100 feet deep) and 19 gigawatts in deeper water (100-200 feet deep), compared to 42 GW of currently installed electrical capacity in the region.⁹² Wind farms off this OCS planning area could produce 17% of the Washington and Oregon's electric supply⁹³ The Electric Power Research Institute estimates the entire Pacific

Coast contains 440,000,000 MWh of wave power potential annually⁹⁴ – or more electricity than Oregon, Washington and California combined currently generate.⁹⁵

Table 7

Value of Coastal Dependent Business in the Pacific Areas	
Coastal Tourism (2007)	\$61.98 B ⁹⁶
Commercial Fishing (2007)	\$453 M ⁹⁷
Recreational Fishing (2006)	\$3.08 B ⁹⁸
Total	\$65.51 Billion

Note: See Appendix 1 for State by State values for coastal tourism, commercial fishing and recreational fishing.

Given the large population along California’s coasts, favorable weather and the huge variety of coastal recreational opportunities, it should come as no surprise that the Pacific Coast has the largest single value for coastal dependent business of any planning area. The value of sustainable coastal recreation and fishing for the whole region exceeds \$65 Billion per year. Aside from the Gulf of Mexico and Alaska, this region also has the largest undiscovered oil and gas reserves. The total value of this oil and gas is large, over \$574 Billion, but this would be produced over a 25-year period typical of oil fields.

On an annual basis, the oil and gas produced off the Pacific coast would be worth \$23 billion per year. At \$65 billion per year, sustainable use of the ocean for coastal recreation and fishing is worth almost 3 times larger than extraction (see Table 1).

Appendix 1
Coastal Dependent Business By State

State	Leisure and Hospitality ¹	Recreational Fishing ²	Commercial Fishing ³	State total
North Atlantic				
Maine	\$1,333,425,140	\$102,463,593	\$361,847,000	\$1,797,735,733
New Hampshire	\$665,015,210	\$68,690,766	\$18,842,000	\$752,547,976
Massachusetts	\$7,638,144,686	\$823,279,883	\$437,044,000	\$8,898,468,569
Rhode Island	\$1,759,000,000	\$188,547,745	\$98,575,000	\$2,046,122,745
Connecticut	\$3,838,445,402	\$207,072,810	\$36,891,000	\$4,082,409,212
New York	\$31,230,394,975	\$645,517,434	\$57,706,000	\$31,933,618,409
New Jersey	\$10,369,371,079	\$1,082,635,831	\$136,053,000	\$11,588,059,910
Total	\$56,833,796,492	\$3,118,208,062	\$1,146,958,000	\$61,098,962,554
Mid-Atlantic				
Delaware	\$1,382,000,000	\$78,930,191	\$5,692,000	\$1,466,622,191
Maryland	\$4,958,501,915	\$581,574,245	\$53,581,000	\$5,593,657,160
Virginia	\$3,746,065,470	\$494,067,280	\$109,071,000	\$4,349,203,750
North Carolina	\$1,153,842,658	\$913,124,494	\$70,124,000	\$2,137,091,152
Total	\$11,240,410,043	\$2,067,696,210	\$238,468,000	\$13,546,574,253
South Atlantic				
South Carolina	\$3,006,235,344	\$1,051,707,000	\$17,025,000	\$4,074,967,344
Georgia	\$1,046,735,453	\$230,487,000	\$11,533,000	\$1,288,755,453
Florida (E Coast)	\$17,206,934,540	\$2,357,520,000	\$41,961,000	\$19,606,415,540
Total	\$21,259,905,337	\$3,639,714,000	\$70,519,000	\$24,970,138,337
Gulf of Mexico				
Florida (W Coast)	\$11,520,056,547	\$2,766,420,000	\$150,323,000	\$14,436,799,547
Alabama	\$680,627,057	\$378,557,000	\$49,178,000	\$1,108,362,057
Mississippi	\$1,324,641,516	\$102,347,000	\$21,737,000	\$1,448,725,516
Louisiana	\$2,673,128,340	\$757,092,000	\$255,265,000	\$3,685,485,340
Texas	\$9,157,783,755	\$1,793,002,000	\$197,292,000	\$11,148,077,755
Total	\$25,356,237,215	\$5,797,418,000	\$673,795,000	\$31,827,450,215
West Coast				
Washington	\$8,168,160,070	\$550,035,495	\$215,789,000	\$8,933,984,565
Oregon	\$866,673,389	\$250,235,372	\$107,523,000	\$1,224,431,761
California	\$52,948,364,440	\$2,282,694,375	\$129,910,000	\$55,360,968,815
Total	\$61,983,197,899	\$3,082,965,242	\$453,222,000	\$65,519,385,141
Total (all regions)	\$176,673,546,986	\$17,706,001,514	\$2,582,962,000	\$196,962,510,500

Notes for Appendix 1

1. Source: National Ocean Economics Program, 2007. Available at <http://noep.mbari.org/Market/coastal/coastalEcon.asp>

Accessed 10/19/09 using only 'near shore' and 'shore adjacent' counties with leisure & hospitality supersector only for economic activity.

Note: This estimate does not include multiplier effects of coastal tourism to businesses beyond hotels, restaurants, sporting goods, marinas and the like. Therefore, it is a very conservative estimate of the value of beach and ocean based tourism and may substantially underestimate the full value of economic impacts. It may be very different from numbers from state tourism bureaus or departments of economic development.

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Note: This report, based on the U.S. Fish and Wildlife Service's 2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation, provides information about angler numbers, annual days of fishing, sportfishing expenditures and their associated economic impacts. This estimate of the value of recreational fishing does include a multiplier effect based on direct wages, salaries, and tax revenues. Recreational fishing in Florida split for east and west coast based on ratio of hospitality and leisure expenditures on both coasts.

3. Source: *Fisheries Economics of the United States 2006*, NOAA Fisheries: Office of Science and Technology. Available at: http://www.st.nmfs.noaa.gov/st5/publication/economics_communities.html.

Note: This is the value of fish/shellfish when sold from fishermen to wholesaler/processor. It does not include the value added in the retail food chain or any multiplier effects. Therefore it is a very conservative way to value commercial fishing because it excludes the impact of processing, harvester wages, and the rest of the sales chain.

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⁸⁸ United States Department of Energy (2009, April 14). State Electricity Profiles 2007, Energy Information Administration. http://www.eia.doe.gov/cneaf/electricity/st_profiles/sep2007.pdf. Accessed 5/29/09.

⁸⁹ Department of Interior (Minerals Management Service), Draft Proposed Outer Continental Shelf (OCS) Oil and Gas Leasing Program 2010-2015, January 2009, p. 90 Available at :
[http://www.mms.gov/5-Year/PDFs/2010-2015/DPP%20FINAL%20\(HQPrint%20with%20landscape%20maps,%20map%2010\).pdf](http://www.mms.gov/5-Year/PDFs/2010-2015/DPP%20FINAL%20(HQPrint%20with%20landscape%20maps,%20map%2010).pdf)
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Department of Interior (Minerals Management Service), *Report to Congress: Comprehensive Inventory of US OCS Oil and Natural Gas Resources*, February 2006, Table 1(b) Total Endowment of Technically Recoverable Oil and Gas, pg 20. Available at:
<http://www.mms.gov/revaldiv/PDFs/FinalInventoryReportDeliveredToCongress-corrected3-6-06.pdf>

Total OCS oil and gas was calculated by combining the Unleased, Undiscovered Economically Recoverable Resources from the MMS report, *Draft Proposed Outer Continental Shelf (OCS) Oil and Gas Leasing Program 2010-2015*, January 2009, Table 5 on page 90 at recent prices (\$60 per barrel of Oil and \$6.41 per thousand cubic feet of natural gas) with the Reserves and Reserves Appreciation estimates for the Gulf of Mexico OCS from the MMS report, *Report to Congress: Comprehensive Inventory of US OCS Oil and Natural Gas Resources*, February 2006, Table 1(b) Total Endowment of Technically Recoverable Oil and Gas, pg 20.

⁹⁰ United States Department of Energy (2009, February). Petroleum Basic Statistics, Energy Information Administration. <http://www.eia.doe.gov/basics/quickoil.html>. Accessed 5/28/09.

⁹¹ United States Department of Energy (2009, April 29). Natural Gas Consumption by End Use, Energy Information Administration. http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm. Accessed 5/28/09.

⁹² United States Department of Energy (2009, April 14). State Electricity Profiles 2007, Energy Information Administration. http://www.eia.doe.gov/cneaf/electricity/st_profiles/sep2007.pdf. Accessed 5/29/09.

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⁹³ United States Department of Energy (2009, January 21). Existing Capacity by Energy Source, Energy Information Administration. <http://www.eia.doe.gov/cneaf/electricity/epa/epat2p2.html>. Accessed 5/29/09.

⁹⁴ Electric Power Research Institute (2005, March 15). Wave Power Feasibility Study, Final Project Briefing.
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⁹⁵ United States Department of Energy (2009, April 14). State Electricity Profiles 2007, Energy Information Administration. http://www.eia.doe.gov/cneaf/electricity/st_profiles/sep2007.pdf. Accessed 5/29/09.

⁹⁶ “National Ocean Economics Program, 2007” 15 October, 2009
<http://noep.mbari.org?Market?coastal/coastalEcon.asp>

⁹⁷ *Fisheries Economics of the United States 2006*, NOAA Fisheries: Office of Science and Technology.:
http://www.st.nmfs.noaa.gov/st5/publication/economics_communities.html

⁹⁸ “Sportfishing in America” American Sportfishing Association 1 July 2008. 3 June 2009.
<http://www.asafishing.org/asa/images/statistics/resources/Sportfishing%20in%20America%20Rev.%207%2008.pdf>