Too Much At Stake:

Don't Gamble with North Carolina's Coast

ENVIRONMENT
NORTH CAROLINA
RESEARCH & POLICY CENTER

Too Much At Stake: Don't Gamble With North Carolina's Coast

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BP Deepwater Horizon drilling rig on fire (April 21, 2010), Coast Guard.
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Table of Contents

	Page
Executive Summary	1
North Atlantic (Maine – New Jersey)	8
Mid-Atlantic (Delaware – North Carolina)	13
South Atlantic (South Carolina – Florida)	17
Gulf of Mexico (Florida – Texas)	22
Pacific Coast (California – Washington)	30
Conclusion	35

Tables & Figures

- Table 1: Annual Value of Sustainable Ocean Activities versus Oil and Gas Extraction by Region 2
- Table 2: One Year Tourism Impacts from BP Deepwater Horizon Spill-Sized Event 5
- Table 3: Special Places and Wildlife 6
- Table 4: Value of Coastal Business – North Atlantic 12
- Table 5: Value of Coastal Business – Mid-Atlantic 16
- Table 6: Value of Coastal Business – South Atlantic 21
- Figure 1: Gulf of Mexico with Special Places 23
- Table 7: Value of Coastal Business – Gulf of Mexico 29
- Table 8: Value of Coastal Business – Pacific Coast 34

Appendix 1: Coastal Dependent Business by State 37

Appendix 2: Coastal Dependent Jobs by State 39

Appendix 3: Oil & Gas Resources and Value by Planning Area 41

Methodology 43

Endnotes 47

Executive Summary

In the long debate over management of the outer continental shelf (OCS), the oil industry and some policy makers have claimed that our tax base and coastal jobs rely on expanding oil and gas drilling to new places. However, one set of issues –-critical to healthy oceans-- that has largely been ignored in this debate is the potential economic losses that new offshore drilling creates for our *existing* coastal economies and the potential for damage to treasured coasts and marine resources.

This report makes it clear in dollars and cents that our clean beaches, coasts and oceans are worth too much to risk another drilling disaster like BP's oil spill in the Gulf. In fact, the annual value of tourism and fishing in most coastal regions is many times higher than the annual value of any oil or gas that might be found there. Offshore drilling is incompatible with more sustainable activities like tourism and fishing because drilling inevitably results in large oil spills, chronic pollution, and industrializing the coast for oil facilities. We only have to look at the immense damage that the BP Deepwater Horizon spill did to the Gulf of Mexico's fishing, tourism and wildlife to recognize what impact drilling would have on other coasts.

In addition to the large economic benefits that flow from use and enjoyment of the ocean, the report highlights the special marine ecosystems, treasured beaches, and extraordinary marine life in our waters. Our coasts are lined with beaches visited by tens of millions annually, national wildlife refuges, parks, and sensitive marshes and bays. Offshore in the ocean, some underwater environments rival rain forests in biological diversity and exceed the productivity of grasslands. Our coastal oceans have sea grass beds, kelp forests, submarine canyons, rich fishing grounds, shallow corals, and deepwater corals, all of which can be damaged by oil spills.

Both the Bush and Obama administrations have proposed expanding offshore drilling outside the Central and Western Gulf of Mexico. But for economic and environmental reasons, we believe that offshore drilling should not be expanded beyond the Central and Western Gulf to areas like the Eastern Gulf of Mexico, the Atlantic Ocean, the Pacific coast, or Alaskan waters. BP's Deepwater Horizon spill in the Gulf provides us with a very tangible example of the huge economic and environmental damage that a large spill can cause. The report reaches the following conclusions:

Our Oceans and Coasts Are Worth More Wild Than As Oil Field.

- According to U.S. government data, the annual value of tourism in coastal counties of the U.S. exceeds $190 billion, not including any indirect economic multiplier effects. The annual value of commercial and recreational fishing in the ocean exceeds $34 billion. Altogether, coastal businesses dependent on clean oceans and beaches generated $225 billion in 2008. (See Table 1 & Appendix 1)

- Nationwide, more than 4.5 million people are employed in coastal counties in the tourism industry and in recreational and commercial fishing and processing. (See Appendix 2)

- In coastal counties of the Gulf of Mexico, the heart of the offshore drilling industry, jobs dependent on tourism and fishing (777,000) exceed all natural resource extraction and mining (which includes oil and gas drilling) employment (154,000) by five times. [1]

- The annual value of businesses dependent on clean oceans and beaches like tourism and fishing exceeds the annual value of estimated oil and natural gas resources in all regions with one exception. (See Table 1)

- In the North Atlantic and Mid-Atlantic states, the value of sustainable activities is approximately 12 times and 4 times larger, respectively, than the value of any oil and gas production.

- In the South Atlantic, coastal tourism and fishing have a yearly economic yield 20 times larger than the yield from potential offshore drilling.

- In the Eastern Gulf of Mexico, the most hotly contested area for new drilling, sustainable businesses like tourism and fishing generate almost three times the value that new oil and gas drilling would.

Table 1
Annual Value of Coastal Dependent Business 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)	$62.3	$5.3	11.8
Mid-Atlantic (DE, MD, VA, NC)	$16	$3.8	4.2
South Atlantic & Straits of Florida (SC, GA, FL east)	$26.8	$1.3	20.6
Eastern Gulf (FL west)	$32.8	$11.3	2.9
West & Central Gulf (AL, MS, LA, TX)	$21.6	$131.1	0.17
Pacific Coast (CA, OR, WA)	$66	$34.2	1.9
Total	$225.3	$185.9	

See Appendix 1 for detailed state by state numbers on "Sustainable Activities" and an explanation of data sources. Sustainable activities are: tourism and commercial and recreational fishing. See Appendix 3 for detailed region-by-region data on amount and value of oil and gas. See Methodology for calculations and assumptions.

- The ability of the oceans and certain coastal ecosystems to capture and hold atmospheric carbon and store it for very long periods of time as long as they are not degraded, makes clear the global importance of healthy oceans and coasts.[2] Onshore oil facilities and offshore spills threaten the health of those ecosystems. Our estimates of the value of coastal dependent businesses do not include the

value of the environmental services like carbon removal that oceans and coasts provide. If added in, the ratio of renewable activities compared to oil and gas value would be even more lopsided.

Damage from Oil Production and Spills Is Real and Costly.

- Numerous reports detail damages from oil and gas exploration, drilling, production and refining[3]. Catastrophic oil spills from platforms, pipelines, tankers/barges, and onshore facilities show that these activities are not compatible with healthy oceans, beaches or coasts. Chronic releases from the drilling process also pollute our oceans. Despite technological advances, the drilling business is still risky. For the ten year period from 2000-2009:[4]

  - The industry spilled 65,000 barrels of oil and drilling material (2.7 million gallons). In 2010, the BP Deepwater Horizon accident spilled almost 200 million gallons into the Gulf.
  - There were 172 spills over 50 barrels (2,100 gallons), an average of 17 spills per year.
  - There were 4,552 incidents which include fatalities, reportable injuries, spills, collisions, pipeline leaks, explosions, times when personnel were gathered for potential evacuation, etc. Of these:
    - 65 were fatalities,
    - 61 were blowouts and loss of well control events which is the kind of accident that led to the Deepwater Horizon tragedy,
    - 1048 were fires and explosions, and
    - 148 (only data for 2009-2006) were events requiring potential or real evacuation of the facility.

- The BP Deepwater Horizon spill in the Gulf gushed oil for 87 days in the spring and summer of 2010. Approximately 200 million gallons escaped from BP's well, spreading across over 40,000 square miles of the Gulf of Mexico, oiling over 600 miles of coast, and creating the largest environmental disaster in our country's history.

- The economic impact from this spill is huge: approximately $2 billion in damage claims already have been paid, and tens of thousands of claims are pending. BP has committed to a $20 billion fund for economic and other losses. Over 250,000 claims have been filed.[5]

- A respected economics consulting firm puts damage to tourism in the Gulf over the next three years at $7.6 to 22.7 billion.[6] Additional damages to commercial fishing and recreational fishing and natural resources have been very large.

- According to government data, the BP Deepwater Horizon oil spill is responsible for heavy wildlife damage: 6,100 dead birds, 605 dead sea

turtles and almost 100 dead marine mammals, though many experts think the toll is much higher because most dead wildlife is never recovered.[7]

- Prevention is the only effective way to stop oil spills. Crude oil is difficult or impossible to clean up in open oceans and many coastal environments, especially if it gets into sandy, muddy or marshy areas. During the BP Deepwater Horizon spill, BP spent over $8 billion on cleanup and only was able to capture less than 10% of the oil released into the Gulf.[8] This is not an unusual result for a spill in the open ocean. Using the word "cleanup" to describe the process of skimming, burning, and booming to capture this small percentage of oil is misleading.

Credit: U.S. Coast Guard photo

Fire boat response crews battle the blazing remnants of the off shore oil rig Deepwater Horizon April 21, 2010. One day later, the Deepwater Horizon sank, unleashing the worst oil spill in U.S. history. Approximately 200 million gallons of oil were released into the Gulf, eventually covering over an area the size of Ohio, killing thousands of birds and sea turtles and oiling over 600 miles of coast.

- Oil exploration and production has been blamed for some of Louisiana's loss of wetlands. The state loses a football field's worth of wetland every 38 minutes, or 25 square miles per year. Since the 1930's, Louisiana has lost 1,900 square miles of wetland, about the size of Rhode Island.[9] The consensus estimate by scientists is that one third of those losses is due to subsidence and dredging for canals and pipelines by the oil industry. [10]

If Drilling Occurs On Other Coasts, a BP Sized Oil Spill Would Cause Immense Damage.

- A BP sized oil spill off the coasts where drilling does not occur today would cause substantial economic damage. Applying the same ratio of damage from a study of Gulf tourism to other regions yields the following potential damages for the first year after the spill only.[11] (See Table 2)

- For example, a BP-sized spill off the North Atlantic coast (ME to DE) would cost the tourism industry between $7 to $14 billion in the first year alone. Research shows that the impact of large spills on tourism lasts up to three years.

Table 2
Tourism Impacts from BP Deepwater Horizon Sized Event
(First Year Only)

Region	Coastal Tourism US$ (Billions)/Yr	Low Impact US$ (Billions)	High Impact US$ (Billions)
North Atlantic	56.83	6.82	14.21
Mid-Atlantic	11.24	1.35	2.81
South Atlantic	21.26	2.55	5.32
Gulf	25.36	3.10	6.34
Pacific	61.98	7.44	15.50

Note: See Methodology for calculations.

Many Special Places Are Threatened by Drilling, Potential Spills and Coastal Industrialization.

- Each area on our coasts has an abundance of special marine ecosystems, unique coastal habitats and beaches, commercially important species, and extraordinary marine life that would be threatened should offshore drilling spread to new areas.

- The risk of oil spills and ecological damage from coastal industrialization continues to threaten our coastal beaches, beach communities, estuaries, and other important marine habitats. 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 Table 3 below. The list in Table 3 is meant to be illustrative, not exhaustive, as there are many important coastal and marine environments not listed which require protection. An exhaustive listing of special marine habitats and coastal areas for each region would be quite lengthy and beyond the scope of this report.

Table 3
Special Places and Wildlife

MMS Planning Region	Examples of Special Places	Examples of Unique Wildlife
North Atlantic (ME, NH, MA, RI, CT, NY, NJ)	Important fishing grounds like Georges Bank, Stellwagen Bank Marine Sanctuary and national seashores, scenic bays like Narragansett Bay, beaches visited by millions, various submarine canyons and seamounts.	Northern right whale, endangered sea turtles, endangered shore birds, deep sea corals
Mid-Atlantic (DE, MD, VA, NC)	Nine major deep water canyons, Chesapeake Bay, Cape Hatteras National Seashore and other coastal parks, deep coral reefs, numerous coastal wildlife refuges, commercial fishing grounds, many beaches in each state.	Northern right whale, seasonal migration path for numerous other whales and dolphins, endangered sea turtles.
South Atlantic (SC, GA, FL east)	South Carolina and Georgia sea islands such as St. Simons, Jekyll, Tybee, Hilton Head, Edisto, Cumberland Island, National Estuarine Research Reserves, Florida state aquatic preserves, beaches used by millions, national parks like the Everglades, deep corals, and Florida Keys National Marine Sanctuary.	Sea turtle nesting, northern right whale calving, manatees.
Gulf of Mexico (FL west, AL, MS, LA, TX)	Numerous underwater banks like the Flower Garden Banks National Marine Sanctuary, Pulley Ridge, Dry Tortugas National Park and Ecological Reserve, Florida state aquatic preserves and numerous beach communities in MS, AL and FL.	Threatened bluefin tuna, endangered sea turtles, several species of endangered whales, manatees.
Pacific Coast (CA, OR, WA)	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.

Offshore Wind, An Alternative to Drilling for Oil, Offers the Potential to Generate Enormous Amounts of Renewable Electricity for Cars, Homes and Factories.

- Instead of using the ocean to produce fossil fuels, we can use them where appropriate to generate enormous amounts of renewable energy. The potential for generating electricity in the U.S. with offshore wind in shallow waters (less than 100 feet deep), using technology employed widely in European systems, is remarkable and untapped. Across all U.S. coasts, the potential for offshore wind is over 1,000 gigawatts. One gigawatt is approximately what two average sized coal or natural gas plants would generate[12].

- Various European countries including Denmark, Germany, the Netherlands, Sweden and the United Kingdom have pioneered this technology off their coasts with a total of 2,377 megawatts (2.3 gigawatts) of capacity already installed and almost 55,000 megawatts (55 gigawatts) permitted or under construction.[13]

- The Atlantic coast and Gulf of Mexico have the largest offshore wind capacities of any region, with a potential of 532 and 340 gigawatts, respectively.

- Offshore wind energy from shallow water could supply nearly two times more generating capacity (532 gigawatts) than all the electrical generating capacity that now exists on the entire East Coast (287 gigawatts).

- Some coasts can generate more electricity with offshore wind projects than they can generate using the oil and gas under the ocean in the region. [14]

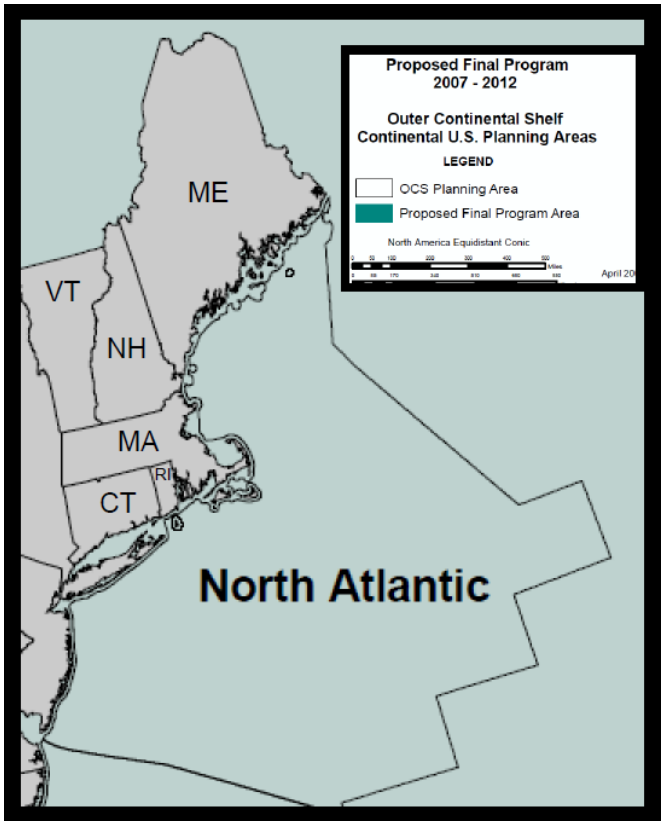
- Offshore wind from the Atlantic could power nearly twice as many vehicles as new oil and gas drilling off the Atlantic coast.

- Offshore wind potential, particularly off the Atlantic coast, could replace oil, gas and some coal generating capacity on the East coast making our air cleaner and reducing global warming pollution. It also could be used to supplement existing generating capacity and to power very large numbers of electric vehicles, thereby reducing U.S. demand for oil.

Protect Our Coasts From Offshore Drilling; It Is Risky for the Environment and A Poor Economic Choice.

We have the power to decide how to utilize our oceans. We can continue to do more and more offshore drilling, affecting the health, diversity and resilience of our oceans. Alternatively, we can decide to use our oceans and beaches for more sustainable activities like wind power, coastal tourism and carefully managed fishing with much smaller impacts on the oceans and coasts. The choice is ours to make. But in making the choice, we should be aware of all the different values, environmental and economic, that are at stake. When factoring in these different values, this report shows that increasing and expanding offshore drilling is not the right economic or environmental choice to make.

North Atlantic



Stretching from Maine to New Jersey, 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.[15] Variations of water stratification, wind, and fresh water inflow affect the transport and distribution of zooplankton, larvae, food (and potentially harmful contaminants) within the area.[16] 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 northern right whales to commercially important species such as lobster and cod. The Sanctuary is the summer home for most of the world's northern right whales and a large humpback population. 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 gems in the National Park System are the Cape Cod National Seashore and Acadia National Park, both on the ocean.

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 in the canyons. This suite of canyons includes Lydonia, Oceanographer, Toms, Hendrickson, Heezen, Gilbert, Alvin, Atlantis, Hudson, Hydrographer, and Veatch Canyons.[17]

Off the New England coast, a chain of more than 30 seamounts called the New England Seamount Chain is home to many rare species found only in a few places or in one place. 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.[18]

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 invertebrate species and 203 fish species 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.[19]

Several species of endangered sea turtle (the leatherback and hawksbill) swim the North Atlantic alongside endangered fish such as the Atlantic salmon and Atlantic wolffish.[20] 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 thrives 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 corals 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. They provide important habitat for deep sea fish and invertebrates.

Oil and gas exploration and drilling could pose serious threats to corals and other fauna unable to avoid the area. Exploration and drilling can 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.[21] 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,[22] although the effects on deep water corals are unknown. Studies have shown that the presence of drilling mud also can inhibit the settlement of invertebrate larvae.[23] 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 resilience among deep sea communities, and slower recovery rates.[24]

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.[25] 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 2009, the states in the North Atlantic planning region landed almost $1 billion dollars ($979 million) of fish and shellfish. This is the value of fish sold by fishermen to the first processor, so this does not include the value added by processing or wholesaling the fish.[26] 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 two ports in New Jersey are among the top 50 ports nationwide in terms of the value of fish-shellfish landed: Cape May-Wildwood and Point Pleasant.[27]

Energy and the Economy

The North Atlantic planning area contains a relatively small amount of undiscovered, economically recoverable oil and natural gas resources. The planning area is estimated to contain approximately 1.33 billion barrels of oil and 7.32 trillion cubic feet of natural gas recoverable at recent prices, representing only 3% and 4%, respectively, of those resources on the total OCS.[28] At current usage and price, natural gas and oil in the North Atlantic could supply the nation with two months of oil use and four months of natural gas use and has a total resource value of $133 billion. [29] See Appendix 3.

Offshore wind power represents a very significant energy resource in the North Atlantic. The National Renewable Energy Laboratory estimates that the North Atlantic region has 100 gigawatts of offshore wind power potential in shallow waters (less than 100 feet deep) compared to 85 GW of currently installed electrical capacity in the region.[30] Offshore wind farms in shallow water could supply 118% of the region's current electric capacity. [31]

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 renewable use of the North Atlantic 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). In addition, over one million jobs in the region depend on the clean beaches and oceans that are fundamental to healthy tourism and fishing.

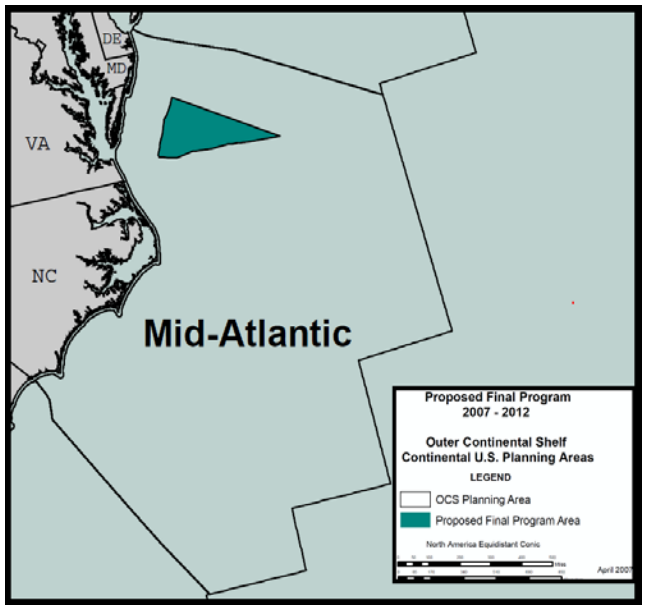
On a purely economic basis, without counting the renewable wind energy that could be harvested from this part of the ocean, it would be much better to use the North Atlantic for tourism and fishing rather than the extraction of nonrenewable oil and gas.

Table 4

Value of Coastal Dependent Business in the North Atlantic Area		
	Economic Value	Jobs
Coastal Tourism [32]	$56.83 billion	1,104,920
Commercial Fishing [33]	$1.90 billion	20,425
Recreational Fishing [21]	$4.31 billion	29,324
Total	$62.30 billion	1,154,669

Note: See Appendix 1 for state by state dollar values for coastal tourism, commercial fishing and recreational fishing and Appendix 2 for state by state jobs in those industries. Totals may not agree due to rounding error.

Mid-Atlantic



The Mid-Atlantic region from Delaware to North Carolina supports a robust fishing and tourism industry, hundreds of miles of beaches and marsh environments, and important ocean ecosystems. Just as certain areas on land serve as migration routes for animals or birds, certain areas of the ocean also 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. There is another migratory corridor farther offshore at the edge of the continental shelf break and slope. This area provides food for a variety of endangered and threatened sea turtles and large marine mammals traveling up and down the coast. 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 four 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.[34]

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, Cape Lookout and Blake Ridge Diapir banks

occur at depths of over 1,200 feet on the western edge of the Blake Plateau and are several hundred feet tall. They have been designated as deepwater coral Habitat Areas of Particular Concern (HAPC).[35] 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.

Also off Cape Fear, about 60 miles southeast, is a marine protected area of approximately 150 square miles called the Snowy Grouper Wreck MPA.[36] Established together with a group of other marine protected areas in the South Atlantic, this site protects the remnants of a population of overfished groupers.

The Cape Lookout reef contains 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 occur rarely anywhere else, if at all.

Another sensitive ecosystem in the Mid-Atlantic is the Chesapeake Bay, the largest estuary in the United States. Heavier, colder saltwater from the ocean flows up into the Bay while more brackish water floating on the surface exits the Bay. Therefore any pollution at the mouth of the Bay, like spilled oil from offshore drilling, can make its way up into the Bay. One species that makes use of this special water movement is the blue crab. The population of blue crabs in the Chesapeake Bay depends on the success of a larval crab stage that floats on the brackish surface water and floats out from the mouth of the Bay as far out as 50-60 miles offshore.[37] Here, tiny crab larvae mature for several weeks, dropping deeper into the water before migrating back into the Bay. Should the vulnerable larvae encounter spilled oil or toxic materials from drilling while they are floating around offshore, 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.[38]

Federal coastal parks in the Mid-Atlantic that would be vulnerable to oil spills 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 up and down the coast.

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 and interactions with commercial fishing, travel along this coast. 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.[39]

There are several species of endangered and threatened sea turtles, including the loggerhead and leatherback, which also are found in relatively high numbers from Cape May, NJ to Cape Hatteras. Sea turtles in the region already are threatened by commercial fishing and loss of nesting habitat. For sea turtles, drilling in this area would be an additional stress.

Fisheries

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.[40] Many species spawn offshore where ocean currents carry the larvae to inshore nursery areas. Other species spawn in this region's plentiful bays and estuaries.

Maryland's state crustacean, the blue crab, has enormous cultural and economic value in this region. In 2009, Delaware, Maryland, Virginia and North Carolina combined hauled in almost 85 million pounds of blue crabs.[41] Mid-Atlantic fisheries also catch millions of pounds of menhaden, croaker, flounder, striped bass and scallops, to name a few. In 2009, the value of this fish and shellfish was over $305 million dollars in sales right off the boat. The region has three ports in the top 50 nationally: Hampton Roads, VA, Reedville, VA and Beaufort-Morehead City, NC.[42]

Energy and the Economy

The Mid-Atlantic planning area contains a small amount of undiscovered, economically recoverable oil and natural gas resources. The planning area is estimated to contain approximately 0.94 billion barrels of oil and 5.54 trillion cubic feet of natural gas, representing less than 2% of oil and 3% of gas resources on the total OCS.[43] At recent prices 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 use and three months of natural gas use. [44] The total value of the oil and gas is $95 billion.

The Mid-Atlantic has the best offshore wind resource in the U.S. and that creates a tremendous opportunity to generate renewable electricity very close to dense

population centers. The National Renewable Energy Laboratory estimates that the Mid-Atlantic contains 298 gigawatts of offshore wind power potential in shallow waters (less than 100 feet), compared to 67 GW of currently installed electrical generating capacity in the region. Wind farms off the Mid-Atlantic planning area would provide about 445% of the current total regional generating capacity.[45]

Table 5

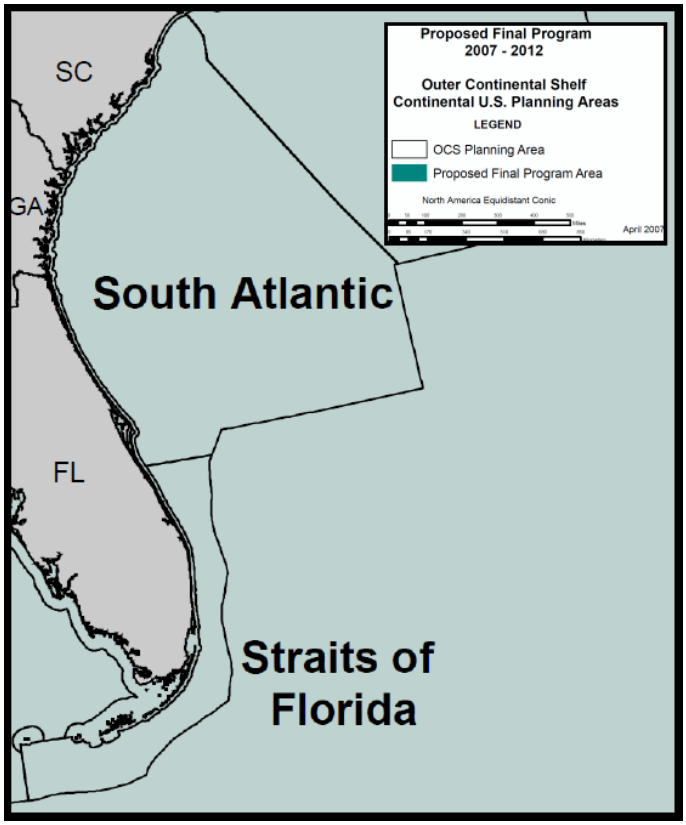
Value of Coastal Dependent Business in the Mid-Atlantic Area		
	Economic Value	Jobs
Coastal Tourism[46]	$11.24 billion	326,182
Commercial Fishing[47]	$666 million	11,030
Recreational Fishing[48]	$4.13 billion	36,271
Total	$16 billion	373,483

See Appendix 1 for state by state dollar values for coastal tourism, commercial fishing and recreational fishing and Appendix 2 for state by state jobs in those industries. Totals may not agree due to rounding error.

The annual value of all coastal dependent businesses such as tourism and fishing in the Mid-Atlantic exceeds the annual value of oil and gas by more than 4 to 1 (see Table 1). Over one third of a million people work in coastal tourism and fishing-related businesses in this region.

If you include the huge potential for renewable energy production off the Mid-Atlantic coast with these other uses of the ocean, sustainable uses dwarf the value of nonrenewable fossil fuel potential. There is enough wind energy available in the shallow waters of this area to replace all the existing electrical generating capacity from 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



Stretching from South Carolina to the Florida Keys, the South Atlantic and Straits of Florida is ranked first in terms of primary productivity among all of the planning areas based on a measure of marine productivity used by the Department of the Interior.[49] 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 were identified by the South Atlantic Fishery Management Council as sensitive habitats worthy of protection from destructive fishing practices. After a lengthy process, the Council decided to protect them. The coral features designated for protection include (from north to south) Stetson Reef, Savannah, East Florida, Miami Terrace, and Pourtales Terrace. Seven other special marine protected areas have been recently established by the Council to protect a variety of important habitats and species.

Special Places

Beaches and Parks

The coastline of the South Atlantic is famous for its white sand beaches and well preserved wetlands. Each state has storied beaches and beach communities like Hilton Head and Myrtle Beach in South Carolina or Tybee Island and Cumberland National Seashore where wild horses roam the beach in Georgia. Of course Florida's east coast is lined with world famous beaches and tourist destinations for millions.

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 Sate of Florida has set aside hundreds of thousands of acres of coastal aquatic preserves in more than one dozen areas along its east coast.[50]

Corals:

Approximately 120 nautical miles off the coast of Charleston, South Carolina, the 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.[51]

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.[52]

Over 40,000 coral colonies 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.[53]

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 greeneys, conger eel, red dory, blackbelly rosefish, codling, dogfish, rattail, skates, sharks and jacks.[54]

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.[55]

There are seven additional marine protected areas established in 2009 along this coast to protect important habitats and species. Each is typically 50 to 100 square

miles in size and protects an important local population of fish, often snappers and groupers, which have been overfished in the South Atlantic. [56]

Estuaries & Islands:
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.[57]

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.[58]

South of Sapelo, almost at Georgia's border with Florida, lies the Cumberland Island National Seashore, the largest of the Georgia sea islands which is almost entirely a national park. Behind the island lies a back bay with tens of thousands of acres of marsh. The island hosts nesting sea turtles and hundreds of species of migratory and resident birds, including some endangered species.

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.[59]

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 and hawksbill turtles can be found in the waters off Florida's Atlantic coast, although they don't often nest here. In the last decade, loggerhead populations in Florida have been dwindling, with an estimated 40% decline in nesting population on the beaches of Southeastern Florida.[60] Loggerheads are considered threatened, while leatherback, green, and hawksbill are listed as endangered species.

Sea turtle populations in the South Atlantic are already under intense stress from industrial fishing, as turtles are caught often as bycatch. Nesting habitat destruction due to beach development and artificial lighting, plastic marine debris that turtles mistake for food, and other pollutants are contributing to population declines.

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. Seismic testing or drilling in this area during birthing season would be disastrous to this tiny population down to its last 350-400 members. 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.

Fisheries

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 2009, more than 27 million pounds of finfish, shellfish, sponges, octopus and squid were landed and North Carolina landed over 68 million pounds of fish and shellfish. Both commercial and recreational fishing are big businesses in the South Atlantic. All species combined, commercial fisheries in the South Atlantic landed $67 million dollars of seafood in 2009.[61]

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Energy and the Economy

The South Atlantic and Straits of Florida planning areas contain a very small amount of oil and natural gas resources. The planning areas are estimated to contain approximately 0.32 billion barrels of undiscovered, economically recoverable oil and 1.70 trillion cubic feet of natural gas, representing less than 1% of those resources on the total OCS.[62] At recent prices and usage, natural gas and oil from the South Atlantic could supply the nation with about 15 days of oil and less than one month of natural gas at a value of $32 billion. [63]

Offshore wind could provide a substantial amount of electricity to the South Atlantic states. The National Renewable Energy Laboratory estimates that the South Atlantic Bight (roughly the same states) contains 134 gigawatts of offshore wind power potential in shallow waters (less than 100 feet deep), compared to 115 GW of currently installed electrical capacity in the region.[64] Wind farms off the South Atlantic planning area therefore could provide about 117% of the current total regional generating capacity.[65]

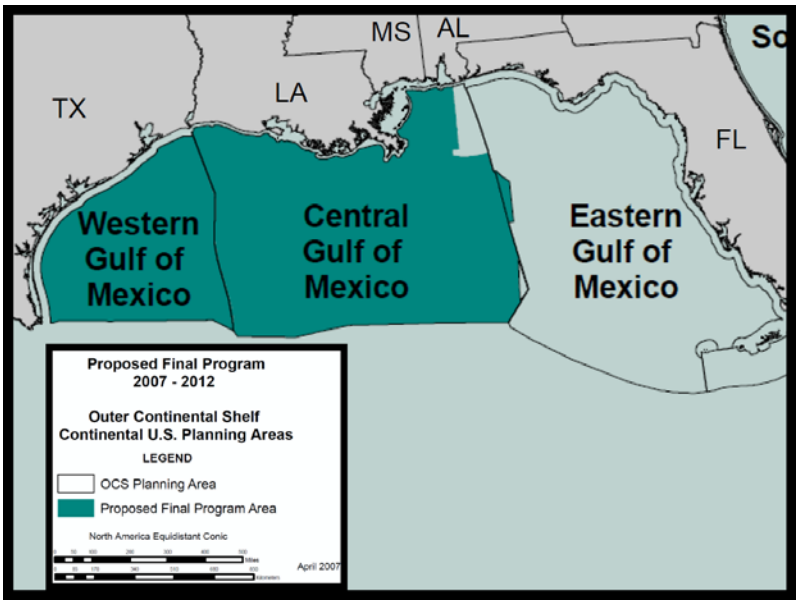
Table 6

Value of Coastal Dependent Business in the South Atlantic Area		
	Economic Value	Jobs
Coastal Tourism	$21.26 billion[66]	496,737
Commercial Fishing	$738 million[67]	9,057
Recreational Fishing	$4.84 billion[68]	43,525
Total	$26.84 billion	549,319

See Appendix 1 for state by state dollar values for coastal tourism, commercial fishing and recreational fishing and Appendix 2 for state by state jobs in those industries. Totals may not agree due to rounding error.

With a conservative annual value of over $26 billion, the economic benefits from coastal dependent businesses like tourism and fishing are reasonably close to the total value of oil and natural gas estimated to lie offshore. The annual value of coastal dependent businesses in the region exceeds the annual value of oil and gas ($1.3 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 economic activity tied to a clean ocean and coast versus unsustainable oil and gas extraction even more lopsided.

Gulf of Mexico



The Gulf of Mexico, stretching from the west coast of Florida to Texas, has been in the news a lot lately due to the BP Deepwater Horizon spill. The ninth largest body of water in the world, the Gulf of Mexico contains half of the United States' wetlands.[69] 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.[70]

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.

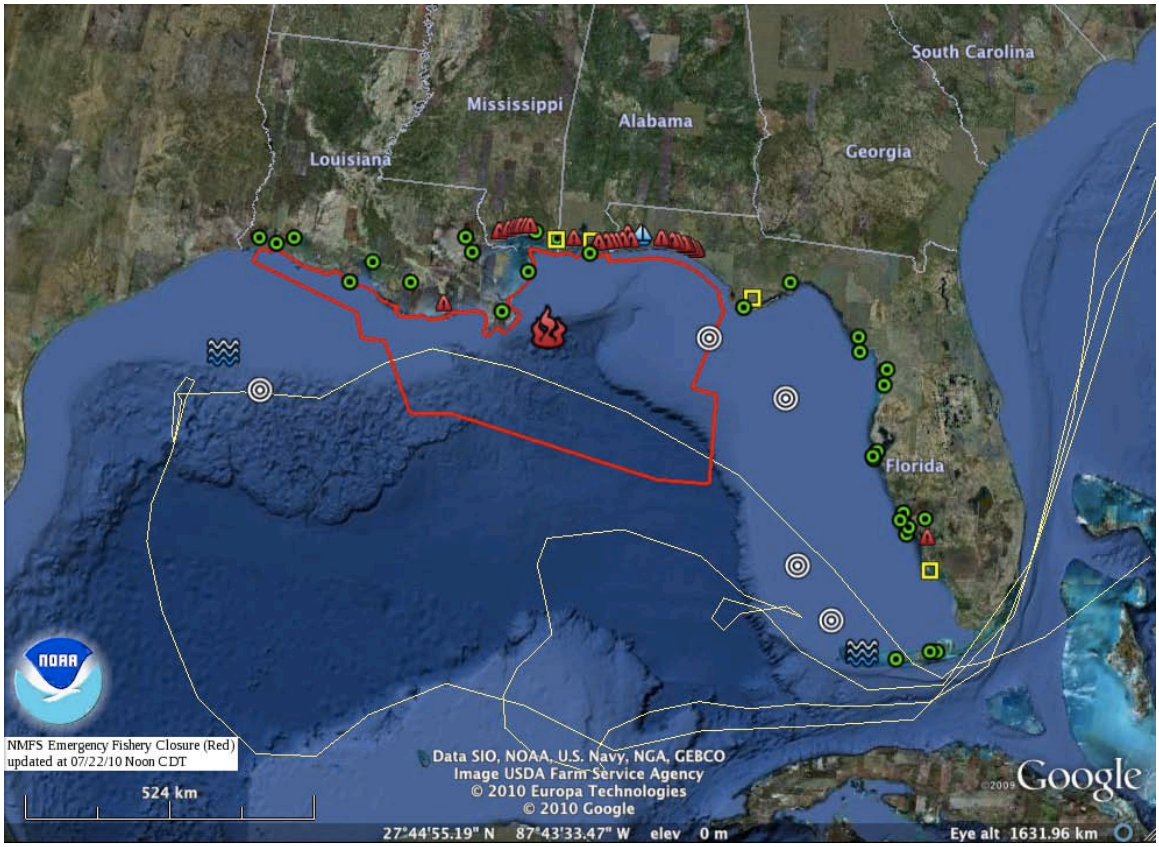
Special Places

The natural seafloor structures that lie underneath the Gulf of Mexico provide diverse habitats. Figure 1 displays some of the most important special places in the Gulf which include: national wildlife refuges, marine sanctuaries, habitat areas of particular concern, beaches, and national parks.

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.[71]

Figure 1 Gulf of Mexico with Selected Special Places



	National Marine Sanctuary
	National Estuarine Research Reserve
	USFWS National Wildlife Refuge
	Beach Closing due to Deepwater Horizon Oil Spill
	Habitat Areas of Particular Concern
	NOAA Emergency Fishing Closure
	Atlantic Bluefin Tuna Migration Path
	Gulf Islands National Seashore
	Deepwater Horizon Oil Spill Site

Source: Google Earth and Environment America.

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 corals, 250 species of invertebrates, 175 species of fish, and 80 algae species.[72]

In 2005, the Gulf Fisheries Management Council designated approximately one dozen areas as Habitat Areas of Particular Concern, or HAPC, near the Florida coast and in the NW Gulf. Many of these have been designated with fishing and anchoring restrictions. HAPC's are typically special habitats where fish aggregate to spawn or are used extensively for some specific life phase of an animal. These include: Pulley Ridge, Florida Middle Grounds, Madison Swanson, the Dry Tortugas Ecological Reserve, etc.

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 which enable 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.[73]

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 and shellfish species. These shallow areas serve as important habitat for some of the largest populations of oysters and crabs in the U.S. 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.[74] Unfortunately, the wetlands of the Gulf, especially in Louisiana, are under stress from: sea level rise, subsidence from energy production, sediment starvation due to flood control levees, pollution, and dredging. Scientists estimate that Louisiana is losing 25 square miles of marsh a year.

Special areas of protected coastal habitat in the Gulf include the thirty-one national wildlife refuges that line the coast. In addition, there are several national seashores:

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, some 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 in the Gulf 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.[75]

Sea turtles, a group of threatened and endangered animals, also inhabit the Gulf of Mexico. Off the coast of Texas, Padre Island is a key nesting habitat for Kemp's Ridley turtles, the smallest species of sea turtle. Loggerhead, leatherback, green, and hawksbill turtles also can 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 and the threatened gulf sturgeon. Certain sharks and grouper are "species of concern." Many highly endangered birds such as the whooping crane, piping plover, and the threatened bald eagle all have extensive habitat here.[76]

Fisheries

In 2009, commercial fisheries in the Gulf of Mexico caught 1.4 billion pounds of seafood worth $629 million dollars, with menhaden accounting for almost 1 billion pounds and shrimp being the next largest catch.[77] Other major fisheries include blue crabs, oysters, spiny lobsters, and many species of finfish including grouper, snapper, tuna, and sharks. The Gulf produces most of the Nation's domestically harvested crabs, oysters and shrimp. Thirteen of the top 50 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 $12 billion of value. Commercial fishing should become much more valuable as depleted populations are rebuilt in coming decades.

BP Deepwater Horizon spill

The impact of the BP Deepwater Horizon spill on the people, economy, and biology of the Gulf has been disastrous. Between April 20 when the well blew up killing 11 men and placement of a temporary cap on the well 87 days later on July 15, approximately 200 million gallons of oil gushed into the Gulf. Scientists estimated the flow at 60,000 barrels per day.[78] At its peak, oil hit over 600 miles of the Gulf coast from west of the Mississippi River all the way to east of Pensacola, Florida. The oil slick covered a total of 44,000 square miles of the Gulf at one time or another, the size of the state of Ohio. This forced the closure of over 80,000 square miles of the Gulf to fishing. There is some evidence that a very small part of the spill became caught up in the Florida Loop Current and may have taken a ride on strong currents past the Florida Keys and up the eastern side of Florida. Luckily, this did happen to the vast bulk of the spill.

The scope of biological and economic damage is breathtaking and tragic. Over 6,000 birds were collected dead, and many more thousands probably died. Nearly 1,000 sea turtles have died or were seriously oiled.[79] Two hundred square miles of marsh was oiled in the hardest hit parish in Louisiana, and many oyster beds have been closed to harvesting or have very high mortality. Crab, shellfish, and fish larvae and eggs all were floating at the ocean's surface when the spill happened. Oil, dispersants, skimming and burning are all likely to have taken their toll on this year's young. Some of the impact will not be apparent for several years.

Much of oil never reached the surface due to the depth of the spill and dispersant that was used at the wellhead 5,000 feet down.[80] The oil has been broken down into very small droplets, described as fine clouds that were detectable as plumes under the surface. A great deal of oil has likely spread very long distances at very deep depths in this fashion. Some oil has been found in large, thick blankets at the bottom of the Gulf. Scientists are not sure how this deep oil pollution will affect the Gulf and its inhabitants. We do know, however, that at cold temperatures and little oxygen, oil can remain toxic for a long time. We also know that small droplets of oil are more likely to be taken up by creatures at the bottom of the food chain where the oil can affect many biological processes.

Small amounts of oil trapped in Prince William Sound beaches and sediments after the Exxon Valdez spill are still slowly leaking out and wreaking havoc on some species 20 years later. Similarly, BP oil has been spotted underneath sandy beaches and buried in muddy marsh sediments all around the Gulf where it may slowly leak out into the water column just as it does in Prince William Sound, Alaska.

Economic damage from the spill is huge. Tens of thousands of fishermen and seafood processors could not work because much of the central and eastern Gulf was closed to recreational and commercial fishing. Summer tourism at Gulf beaches plummeted, even in places where very little oil came ashore. Billions of dollars of tourism revenue have probably been lost. One study, done by Oxford Economics, predicts a loss of between $7.6 and $22.7 billion in the Gulf tourism industry over the first 15 to 36 months after the spill.[81] Studies of the real impact will have to wait for the damage to become apparent in employment numbers, corporate earnings, and state revenues. The Oxford study is based on the size and duration of impacts from other oil spills and natural disasters. The economy could take years to recover, as it frequently takes several years for travelers to return to their old tourism patterns once they perceive that beaches and resorts in an area are damaged.

BP and Ken Feinberg's Gulf Coast Claims Facility have paid out nearly $2.0 billion in claims for economic damages.[82] Over 250,000 claims have been filed to date. Final claims, where amounts will be much larger, have not been paid. Almost one third of the Gulf Coast Facility Claims have been paid to people and businesses in Florida, which is an indication of the impact on the tourism industry there.

Energy and the Economy

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.[83] Comparing this estimated amount with total resources projected for the all of the U.S. 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, much in shallow water off Texas and Louisiana. Unfortunately, there are no consistent wind data available for west coast Florida, Alabama or Mississippi. According to the National Renewable Energy Laboratory, the Gulf (i.e, Texas and Louisiana) contains 340 gigawatts (GW) of offshore wind power potential in shallow water (less than 100 feet deep), compared to 230 GW of currently installed electrical capacity in the region.[84] These areas, located off the coast of Texas and Louisiana, could potentially power 150% of the Gulf of Mexico's installed electrical capacity. [85]

<u>Eastern Gulf of Mexico (West Coast of Florida):</u>

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 off the west coast of Florida. This planning area has much less oil and gas than the rest of the Gulf of Mexico. Government estimates indicate 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.[86] This represents approximately 6% of the total endowment of oil and natural gas offshore. Data on renewable wind resources in the Eastern Gulf of Mexico is not available, so it is not possible to say what the potential is, 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.

Using data that just measures tourism and fishing, the annual value of coastal tourism and fishing-dependent business on the west coast of Florida is $17.7 billion. However, there are several reasons, unique to Florida, why counting only leisure and hospitality business and fishing seriously underestimates the real value of the sustainable coastal dependent economy there. For decades, Florida has been a destination for millions of retirees and those seeking seasonal homes (i.e. living in Florida for several months a year). These retirees and seasonal visitors are drawn by the mild weather and environment, including clean beaches and oceans. The leisure and hospitality businesses like hotels and motels that are included in our measure of 'Coastal Tourism' mostly serve short term visitors, not these more permanent residents and seasonal visitors who are not staying in hotels or motels or eating out in restaurants all the time.

One way to approximate the economic impact of retirees and seasonal visitors and how oceans and beaches affect their housing location decisions is to look at how fast the populations of coastal counties grew over time versus adjacent landlocked counties. Surely, some of the reasons why people move in larger numbers to coastal counties have to do with their access to clean oceans and beaches.

On the west coast of Florida, three times more people moved to coastal counties from 2000-2008 than moved to adjacent inland counties. Coastal counties grew by 490,000 *more* people during that 8 year period than comparable inland counties lying just behind them[87]. If we estimate the incremental economic activity generated annually by this additional population surge (2000-2008) to the coasts (i.e. new people times average gross domestic product per capita), the coastal environment generates an additional $15.8 billion on an annual basis[88]. Adding *just* 8 years worth of incremental coastal population growth to the base of coastal dependent business activity, yields a total of $32.8 billion for the value of sustainable coastal dependent business on the west coast of Florida only. If we added additional decades of incremental coastal population growth, our estimate of the value of coastal dependent businesses and the ratio to oil and gas would expand accordingly.

The real estate market provides another indicator of the value of the clean oceans and beaches in the west coast of Florida. While the real estate market certainly has declined in Florida over the last two to three years, in 2006, the most recent data available, Florida Gulf Coast coastal properties were valued at $79.6 billion. This shows there was a great deal of property value that could be impacted by a coastal oil spill like BP's Deepwater Horizon.[89] Coastal properties are defined as property directly on the water or between the water and the closest road parallel to the water. If that value was impaired by 10% or 20% because of oil spills or coastal industrialization, the financial loss in wealth would be quite large.

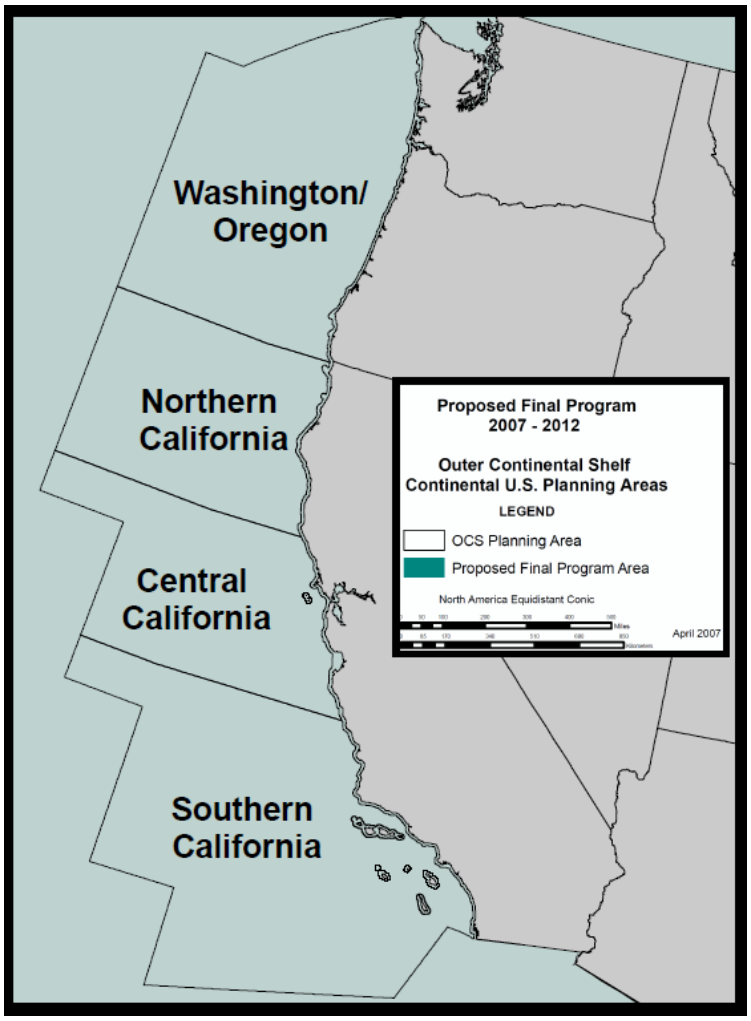
Table 7

Value of Coastal Dependent Business in the Gulf of Mexico Areas		
	Economic Value	Jobs
Coastal Tourism	$25.4 billion[90]	638,155
Value of Additional West FL Growth (2000-2008)	$15.00 billion	See discussion above
Commercial Fishing	$2 billion[91]	25,501
Recreational Fishing	$12.07 billion[92]	113,372
Total	$54.4 billion	777,028

See Appendix 1 for state by state dollar values for coastal tourism, commercial fishing and recreational fishing and Appendix 2 for state by state jobs in those industries. Totals may not agree due to rounding error.

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 always has 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.[93] 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.[94] 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 is famous for its spectacular shores and rugged coastlines. Below the ocean's surface, the corals, sponges, and other colorful seafloor life off of 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.[95]

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 rebuilding from overfishing. Oregon has designated a small number of marine protected areas in state waters at the urging of the Governor and with approval by the legislature. The State is considering several more to protect small, unique areas.

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 or 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.[96]

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 over 250,000 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 key 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 seabirds. 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 also are found in significant numbers. Many whale species abound, including gray, humpback, and killer whales. Many of the same seabirds and migratory birds that exist in northern California also are 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 boccacio and other rockfish species as well as abalone. This area also provides critical rookery habitat for California sea lions as well as the Guadeloupe 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 730 million pounds of seafood in 2009, worth nearly $480 million.[97] 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. Despite the large decline in salmon runs, the West coast still has active fisheries. Twelve of the top 50 ports by value of landings are on the West coast.[98]

Energy and the Economy

California:

California's OCS contains a modest amount of oil and natural gas resources, but its marine environment is incredibly diverse and productive and will be even more productive if and when certain keystone species like salmon recover. The planning area is estimated to contain approximately 9.4 billion barrels of oil and 13.2 trillion cubic feet of natural gas reserves and undiscovered economically recoverable resources at recent prices. This represents about 15% of the oil and 6% of the gas compared to total OCS resources.[99] At current usage rates, the natural gas and oil economically available from California's OCS could supply the nation with around thirteen months of oil use and six months of natural gas useand has a value of $829 billion at current prices. [100]

California's OCS has a small amount of offshore wind resources in shallow waters and excellent wave energy potential. The National Renewable Energy Laboratory estimates that California's OCS contains 4.4 gigawatts of offshore wind power potential in shallow waters (less than 100 feet deep), compared to 64 GW of currently installed electrical capacity in the state.[101] Wind farms in California's OCS planning area could provide 7% of the state's electric generating capacity.[102] The Electric Power Research Institute estimates that the entire Pacific Coast contains 440,000,000 MWh of wave power potential annually[103] – or more electricity than Oregon, Washington and California combined currently generate.[104]

Washington/Oregon:

The Washington/Oregon planning area contains a miniscule amount of oil and natural gas resources, but its marine environments contain high biological diversity and are very productive. The area is estimated to contain approximately 0.3 billion barrels of oil and 1.28 trillion cubic feet of natural gas that is undiscovered and economically recoverable. This represents about 0.6% of total OCS resources for both oil and gas.[105] At recent usage rates, the oil and natural gas economically available from the Washington/Oregon planning area could supply the nation with 15 days of oil and 20 days of natural gas and has a value of $26 billion at current prices. [106]

The Washington/Oregon planning area has moderate offshore wind resources and excellent wave conditions. The National Renewable Energy Laboratory estimates that the area contains 15 gigawatts of offshore wind power potential in shallow waters (less than 100 feet deep), compared to 42 GW of currently installed electrical capacity in the region.[107] Wind farms off this OCS planning area could produce 36%

of the Washington and Oregon's electric generating capacity.[108] The Electric Power Research Institute estimates the entire Pacific Coast contains 440,000,000 MWh of wave power potential annually or more electricity than Oregon, Washington and California combined currently generate.[109]

Table 8

Value of Coastal Dependent Business in the Pacific Areas		
	Economic Value	Jobs
Coastal Tourism	$61.98 billion[110]	1,333,443
Commercial Fishing	$1.67 billion[111]	17,957
Recreational Fishing	$2.31 billion[112]	17,096
Total	$65.96 billion	1,368,496

See Appendix 1 for state by state dollar values for coastal tourism, commercial fishing and recreational fishing and Appendix 2 for state by state jobs in those industries. Totals may not agree due to rounding error.

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 is almost $66 billion per year. The total value of this oil and gas is $855 billion, but this would be produced over a 25-year period typical of oil fields, for an annual yield of $34 billion. At $66 billion per year, sustainable use of the ocean for coastal recreation and fishing is worth almost two times more than fossil energy extraction (see Table 1).

Conclusion

Most public debates about offshore drilling focus on the amount of oil and gas that might lie under our oceans and the resources and revenue we forego by protecting those areas from drilling. That is one side of the story. This report focuses on the other side of the story which is the very large economic and environmental value this country derives from having clean oceans and beaches protected from risky and dirty offshore drilling.

When we calculate the economic value of clean oceans and beaches by looking at the vibrant coastal tourism and commercial and recreational fishing sectors they support, we find that for most regions of the U.S. tourism and fishing outweigh the value of any oil and gas under the ocean. The economic data show in dollars and cents that our oceans are worth more wild than as oil fields. In some regions the tourism and fishing businesses are worth ten or twenty times more than the oil and gas resources might be worth. In other regions the ratio favors tourism and fishing but not by as much.

Our conservative estimates, based on government economic data, are that the coastal economy based on clean oceans and beaches is worth approximately $225 billion per year and employs over 4.5 million people. Clearly, coastal tourism and fishing are important business sectors in the U.S. economy.

The BP Deepwater Horizon oil spill in the Gulf of Mexico demonstrates the reality that coastal tourism and fishing are utterly dependent on clean oceans and beaches. Drilling and its inevitable spills can seriously damage those businesses. Gulf tourism and fishing businesses now face billions of dollars of losses due to the Deepwater Horizon oil spill. Two billion dollars has already been paid out in emergency claims; and the Gulf claims facility has almost twenty billion dollars for more payments to those economically damaged by the spill. Over 250,000 claims for compensation have been filed.

The report shows that a similar spill off the Atlantic or Pacific coasts or closer to Florida's west coast would cause very, very large monetary damages in the billions to coastal tourism and fishing. Damage to the tourism industry from spills typically lasts one to three years, while damage to fisheries can last for generations. Some fisheries have yet to recover from the 1989 Exxon Valdez oil spill in Prince William Sound, Alaska.

Not only are the oceans and coast worth more wild economically, but they host an amazing variety and abundance of special places and unique wildlife. Our coasts are lined with beaches, national parks and wildlife refuges, sensitive bays and estuaries. We have an immense storehouse of biological diversity and unique marine ecosystems in our offshore waters. All these would be threatened by coastal industrialization from the oil industry and by offshore drilling and spilling.

Oceans and coasts that are worth much more wild, special marine ecosystems that would be damaged for long periods by oil spills, the inherent risk of offshore drilling, and the need to move this country in the direction of renewable energy with technologies like offshore wind, are all factors supporting the conclusion that there is too much at stake to gamble with our coasts. Instead, we must protect our coasts from new drilling, end our dependence on oil, and move to a clean energy economy.

Appendix 1

Coastal Dependent Business By State
(GDP or Sales in $)

State	Leisure and Hospitality [1]	Recreational Fishing [2]	Commercial Fishing [3]	State total
North Atlantic				
Maine	$1,333,425,140	$108,242,000	$280,360,000	**$1,722,027,140**
New Hampshire	$665,015,210	$39,009,000	$80,040,000	**$784,064,210**
Massachusetts	$7,638,144,686	$785,893,000	$82,303,000	**$8,506,340,686**
Rhode Island	$1,759,000,000	$166,457,000	$144,963,000	**$2,070,420,000**
Connecticut	$3,838,445,402	$742,753,000	$46,230,000	**$4,627,428,402**
New York	$31,230,394,975	$875,449,000	$213,110,000	**$32,318,953,975**
New Jersey	$10,369,371,079	$1,592,965,000	$309,191,000	**$12,271,527,079**
Total	**$56,833,796,492**	**$4,310,768,000**	**$1,896,924,000**	**$62,300,761,492**
Mid-Atlantic				
Delaware	$1,382,000,000	$223,519,000	$17,935,000	**$1,623,454,000**
Maryland	$4,958,501,915	$999,402,000	$212,699,000	**$6,170,602,915**
Virginia	$3,746,065,470	$618,884,000	$279,304,000	**$4,644,253,470**
North Carolina	$1,153,842,658	$2,291,227,000	$156,173,000	**$3,601,242,658**
Total	**$11,240,410,043**	**$4,133,032,000**	**$666,111,000**	**$16,039,553,043**
South Atlantic				
South Carolina	$3,006,235,344	$487,545,000	$37,515,000	**$3,531,295,344**
Georgia	$1,046,735,453	$311,224,000	$105,028,000	**$1,462,987,453**
Florida (E Coast)	$17,206,934,540	$4,042,417,000	$595,308,000	**$21,844,659,540**
Total	**$21,259,905,337**	**$4,841,186,000**	**$737,851,000**	**$26,838,942,337**
Gulf of Mexico				
Florida (W Coast) *	$26,520,056,547	$5,650,068,000	$595,308,000	**$32,765,432,547**
Alabama	$680,627,057	$455,093,000	$125,654,000	**$1,261,374,057**
Mississippi	$1,324,641,516	$382,778,000	$144,315,000	**$1,851,734,516**
Louisiana	$2,673,128,340	$2,297,078,000	$281,297,000	**$5,532,801,340**
Texas	$9,157,783,755	$3,288,135,000	$541,843,000	**$12,987,761,755**
Total	**$40,356,237,215**	**$12,073,152,000**	**$1,969,715,000**	**54,399,104,215**
West Coast				
Washington	$8,168,160,070	$386,010,000	$534,478,000	**$9,088,648,070**
Oregon	$866,673,389	$157,752,000	$225,014,000	**$1,249,439,389**
California	$52,948,364,440	$1,764,010,000	$910,803,000	**$55,623,177,440**
Total	**$61,983,197,899**	**$2,307,772,000**	**$1,670,295,000**	**$65,961,264,899**
Total (all regions)	**$191,673,546,986**	**$27,665,910,000**	**$6,940,896,000**	**$225,258,327,986**

*See explanation methodology

Notes for Appendix 1

1. Source: National Ocean Economics Program. This is a searchable database that allows the user to specify for each state, using coastal counties only, the economic activity such as wages, number of jobs and GDP in each sector such as leisure and hospitality. GDP for Leisure & Hospitality is from 2007, the most recent year available. At: http://www.oceaneconomics.org/Market/coastal/coastalEcon.asp

2. Source: National Marine Fisheries Service, *Fisheries Economics of the United States 2008; Economics and Sociocultural Status and Trends*, NOAA Technical Memorandum NMFS-F/SPO-109, April 2010. State by state table for Total Sales' for For-Hire, Private Boat and Shore fishermen in "2008 Economic Impacts of Recreational Fishing Expenditures". Available at: http://www.st.nmfs.noaa.gov/st5/publication/fisheries_economics_2008.html

3. Source: National Marine Fisheries Service, *Fisheries Economics of the United States 2008; Economics and Sociocultural Status and Trends*, NOAA Technical Memorandum NMFS-F/SPO-109, April 2010. Data is 2008 Sales from state by state table "2008 Impacts of (state) Seafood Industry". Available at: http://www.st.nmfs.noaa.gov/st5/publication/fisheries_economics_2008.html

Appendix 2

Coastal Dependent Jobs By State

State	Leisure and Hospitality[1]	Recreational Fishing[2]	Commercial Fishing[3]	State total
North Atlantic				
Maine	39,088	1,286	3,176	45,550
New Hampshire	19,413	357	1,123	20,893
Massachusetts	178,981	5,952	6,778	191,711
Rhode Island	52,125	1,467	2,243	55,835
Connecticut	84,349	4,884	651	89.884
New York	525,527	5,766	2,995	534,288
New Jersey	205,437	9,612	3,459	218,508
Total	**1,104,920**	**29,324**	**20,425**	**1,154,669**
Mid-Atlantic				
Delaware	40,691	1,462	299	42,452
Maryland	126,166	7,244	3,454	136,864
Virginia	116,175	5,564	4,534	126,273
North Carolina	43,150	22,001	2,743	67,894
Total	**326,182**	**36,271**	**11,030**	**373,483**
South Atlantic				
South Carolina	82,653	5,509	708	88,870
Georgia	32,354	2,549	1,416	36,319
Florida (E Coast)	381,730	35,467	6,933	424,130
Total	**496,737**	**43,525**	**9,057**	**549,319**
Gulf of Mexico				
Florida (W Coast)	274,059	54,589	6,933	335,581
Alabama	24,820	4,719	1,846	31,385
Mississippi	27,516	2,930	2,715	33,161
Louisiana	57,474	25,590	8,915	91,979
Texas	254,286	25,544	5,092	284,922
Total	**638,155**	**113,372**	**25,501**	**777,028**
West Coast				
Washington	202,390	3,725	8,539	214,654
Oregon	32,678	1,541	2,674	36,893
California	1,098,375	11,830	6,744	116,949
Total	**1,333,443**	**17,096**	**17,957**	**1,368,496**
Total (all regions)	**3,899,437**	**239,588**	**406,163**	**4,545,188**

Notes for Appendix 2

1. Source: National Ocean Economics Program, 2007. This is a searchable database that allows the user to specify for each state, using coastal counties only, the economic activity such as wages, number of jobs and GDP in each business sector such as leisure and hospitality. Available at: http://www.oceaneconomics.org/Market/coastal/coastalEcon.asp

2. Source: National Marine Fisheries Service, *Fisheries Economics of the United States 2008; Economics and Sociocultural Status and Trends*, NOAA Technical Memorandum NMFS-F/SPO-109, April 2010. Data comes from state by state table "2008 Economic Impacts of Recreational Fishing Expenditures". Available at: http://www.st.nmfs.noaa.gov/st5/publication/fisheries_economics_2008.html

3. Source: National Marine Fisheries Service, *Fisheries Economics of the United States 2008; Economics and Sociocultural Status and Trends*, NOAA Technical Memorandum NMFS-F/SPO-109, April 2010. Data comes from state by state table "2008 Impacts of (state) Seafood Industry". Available at: http://www.st.nmfs.noaa.gov/st5/publication/fisheries_economics_2008.html

Appendix 3

Oil and Gas Resources of the U.S. Outer Continental Shelf

Planning Area	Oil[1] (Bbls)	Oil Resources [3] Value in $US	Gas [4] (Tcf)	Gas Resources [5] Value in $US	Total of Oil & Gas Value in $US
Gulf of Mexico					
Western Gulf of Mexico	5.74	$459,200,000,000	33.78	$123,297,000,000	$582,497,000,000
Central Gulf of Mexico	14.37	$1,149,600,000,000	59.52	$217,248,000,000	$1,366,848,000,000
Eastern Gulf of Mexico	3.03	$242,400,000,000	10.97	$40,040,500,000	$282,440,500,000
Reserves (gulf-wide)[2]	13.94	$1,115,200,000,000	58.61	$213,926,000,000	$1,329,126,000,000
Gulf Total	**37.08**	**$2,966,400,000,000**	**162.88**	**$594,511,500,000**	**$3,560,911,500,000**
West Coast					
Washington-Oregon	0.3	$24,000,000,000	1.28	$4,672,000,000	$28,672,000,000
Northern CA	1.63	$130,400,000,000	2.3	$8,395,000,000	$138,795,000,000
Central CA	2.17	$173,600,000,000	2.28	$8,322,000,000	$181,922,000,000
Southern CA	4.15	$332,000,000,000	7.08	$25,842,000,000	$332,000,000,000
Reserves (all CA)[2]	1.46	$116,800,000,000	1.56	$5,694,000,000	$122,494,000,000
Pacific Total	**9.71**	**$776,800,000,000**	**14.5**	**$52,925,000,000**	**$803,883,000,000**
Atlantic					
North Atlantic	1.33	$106,400,000,000	7.32	$26,718,000,000	$133,118,000,000
Mid-Atlantic	0.94	$75,200,000,000	5.54	$20,221,000,000	$95,421,000,000
South Atlantic	0.31	$24,800,000,000	1.69	$6,168,500,000	$30,968,500,000
Straits of Florida	0.01	$800,000,000	0.01	$36,500,000	$836,500,000
Atlantic Total	**2.59**	**$207,200,000,000**	**14.56**	**$53,144,000,000**	**$260,344,000,000**
Alaska OCS Totals	**2.85**	**$228,000,000,000**	**4.49**	**$16,389,000,000**	**$244,389,000,000**
Total OCS	**52.23**	**$4,178,400,000,000**	**196.43**	**$716,969,500,000**	**$4,895,369,500,000**

Notes for Appendix 3

1. In Billions of barrels (Bbls). Department of Interior (Minerals Management Service), Draft Proposed Outer Continental Shelf (OCS) Oil and Gas Leasing Program 2010-2015, January 2009, p. 90. Resource estimated at oil price of $60/barrel. See Methodology for assumptions. Available at: http://www.mms.gov/5-Year/PDFs/2010-2015/DPP%20FINAL%20(HQPrint%20with%20landscape%20maps,%20map%2010).pdf

2. 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

3. Using recent oil price of $80 per barrel as of 10/1/10.

4. In Trillions of cubic feet (Tcf). Department of Interior (Minerals Management Service), Draft Proposed Outer Continental Shelf (OCS) Oil and Gas Leasing Program 2010-2015, January 2009, p. 90. Resource estimated at gas price of $6.41/mcf. See Methodology for assumptions. Available at: http://www.mms.gov/5-Year/PDFs/2010-2015/DPP%20FINAL%20(HQPrint%20with%20landscape%20maps,%20map%2010).pdf

5. Using recent natural gas price of $3.65 per thousand cubic feet (mcf) at Henry Hub as of 10/1/10.

Methodology

Table 1: Annual Value of Coastal Dependent Business Versus Oil and Gas Extraction

"Sustainable Activities" reflects the annual value of coastal county tourism (i.e., Leisure and Hospitality industry), commercial fishing and recreational saltwater fishing. Data comes from regional totals in Appendix 1. There is no economic multiplier effect reflected in coastal county tourism.

"Nonrenewable Oil and Gas Extraction" is the estimated value of oil and natural gas using Minerals Management Service (now Bureau of Ocean Energy Management, Regulation and Enforcement) estimates of reserves (where appropriate) and undiscovered economically recoverable resources. All data comes from Appendix 3. This Appendix uses oil and gas volumes assuming resources that are economic to recover at $60 per barrel of oil and $6.41 per mcf of gas. We chose resource levels recoverable at $60/barrel and $6.41/mcf because these prices are the closest to current prices. Linear interpolation of data for other price levels was rejected because it is not known if there is a linear relationship between price and undiscovered oil and gas resources. For the purposes of valuing resources, all calculations use $80 per barrel for oil and $3.65 per thousand cubic feet (mcf) for gas which are current prices as of 10/1/10. 'Value' is amount of oil and gas times price. The annual calculation for oil and gas assumes even production over 25 year average field life without discounting cash flow. Total oil or gas value is divided by 25 to calculate the 'annual value'.

"Ratio of Sustainable Dollars to Oil and Gas Value' is calculated by dividing Sustainable Activity by Oil and Gas Extraction.

Table 2: Tourism Impacts from BP Deepwater Horizon Sized Event

This table uses data from the Oxford Economics report, "Potential Impact of the Gulf Oil Spill on Tourism", done for the U.S. Travel Association at: http://www.ustravel.org/sites/default/files/page/2009/11/Gulf_Oil_Spill_Analysis_Oxford_Economics_710.pdf. Using historical coastal tourism impacts from other large oil spills and storm events, this report predicts a range of revenue losses on the Gulf's tourism industry from 12% at the low end to 25% at the high end for the first twelve months after the spill and smaller impacts for two more years thereafter. To simplify matters, Table 2 reflects first year impacts only.

To calculate economic damage to the coastal tourism industry, we multiplied the value of coastal county tourism in each region using Leisure and Hospitality data from Appendix 1 times the 12% low impact and 25% high impact to determine the potential damage to tourism revenues in the North Atlantic, Mid-Atlantic, South Atlantic, and Pacific regions.

Appendix 1: Coastal Dependent Business by State

"Leisure and Hospitality" dollars represent GDP or gross domestic product in leisure and hospitality sector businesses in coastal counties only, not the entire state. The most recent year available for that data is 2007. Most states show only a very small change in employment and wages from 2007 to 2008 in this sector; therefore GDP in tourism businesses in 2008, a year for which we do not have GDP data, is most likely comparable to 2007. See Notes for Appendix 1 for data source.

The GDP data for leisure and hospitality 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 total value of beach and ocean based tourism and may substantially underestimate the full value of economic impacts. It may be very different from the numbers produced by state tourism bureaus or departments of economic development. We do not use these state numbers because the methodology will vary from state to state and we wanted a consistent, conservative estimate.

A substantial adjustment was made in leisure and hospitality dollars for Florida, West Coast; this was the only adjustment made in NOEP data. For the west coast of Florida, the NOEP data totaled $11.5 billion in GDP. This estimate is so different from state sources that we believe there are structural reasons why the NOEP database seriously underestimates the real value of the coastal dependent economy in western Florida. For decades, Florida has been a destination for millions of retirees and those seeking seasonal homes (i.e. living in Florida for several months a year). They are drawn by the mild weather and environment, including clean beaches and oceans. The leisure and hospitality businesses like hotels and motels that are included in leisure and hospitality measure mostly serve short term visitors, not these permanent residents and long term visitors who are not staying in hotels or motels or eating out in restaurants all the time.

One way to approximate the economic impact of retirees and seasonal visitors and how oceans and beaches affect their housing location decisions is to look at how fast the populations of coastal counties grew over time versus adjacent landlocked counties in Florida. Some of the reasons why people move in larger numbers to coastal counties have to do with their access to clean oceans and beaches.

On the west coast of Florida, three times more people moved to coastal counties from 2000-2008 than moved to adjacent inland counties. Coastal counties grew by 490,000 *more* people during that 8 year period than comparable inland counties lying just behind them. If we estimate the incremental economic activity generated annually by this additional population surge (2000-2008) to the coasts (i.e. incremental new people times average gross domestic product per capita), the coastal environment generated an additional $15.8 billion on an annual basis which we round to $15 billion. Adding *just* 8 years worth of incremental coastal population growth to the base of coastal dependent business activity, yields a total of $26.5 billion for the value of leisure and hospitality business on the west coast of Florida.

“Recreational Fishing” dollars represent ‘Total Sales’ for For-Hire, Private Boat and Shore fishermen. These include purchases of fishing tackle, other equipment, boat expenses, trip expenses, and second home expenses. Data comes from state by state tables “2008 Economic Impacts of Recreational Fishing Expenditures”. See Notes for Appendix 1 for data source.

The value of “Commercial Fishing” represents the value when sold from fishermen to dealer/processor at the dock (i.e., ex vessel sale value) and the subsequent processing of fish and shellfish. It does not include the sales or impacts from Seafood Wholesalers or Retail. While these typically dwarf the first two stages of production chain, they introduce double counting and most seafood sold in the U.S. is imported. Counting the value of sales of imported seafood in the wholesale and retail distribution chain would be an inaccurate way to characterize the value of domestic production. On the other hand, this method leads to undercounting the value of domestic seafood and is therefore a conservative estimate of

the value of Commercial Fishing. Data comes from state by state tables "2008 Economic Impacts of Recreational Fishing Expenditures". See Notes for Appendix 1 for data source.

Appendix 2: Coastal Dependent Jobs by State

"Leisure and Hospitality" jobs were accessed using only 'near shore' and 'shore adjacent' counties. Jobs represent employment in leisure and hospitality sector businesses. The most recent year of data that includes GDP is 2007 so this table uses employment data from the same year.

The leisure and hospitality 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 and employment from 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.

"Recreational Fishing" jobs represent those related to For-Hire, Private Boat and Shore fishermen. These include Trip Impacts and Total Durable Equipment Impacts. Data comes from a state by state table "2008 Economic Impacts of Recreational Fishing Expenditures". Data is for 2008, the most recent year available.

"Commercial Fishing" jobs were calculated by combining the 'Sales Impacts' for Commercial Harvesters (first sale at dock) and Seafood Processors and Dealers (seafood processing). Data comes from a state by state table "2008 Impacts of (state) Seafood Industry".

Commercial fishing reflects employment in Commercial Harvesting and Seafood Processors and Dealers businesses. It does not include the jobs in Seafood Wholesalers or Retail Seafood. While these typically dwarf the first two stages of production chain, they introduce double counting and most seafood sold in the U.S. is imported. Counting the jobs handling imported seafood in the wholesale and retail distribution chain would be an inaccurate way to characterize the number of jobs related to domestic production. On the other hand, this method leads to undercounting the jobs connected to domestic seafood and is therefore a conservative estimate of the employment in Commercial Fishing.

See Notes for Appendix 2 for data sources.

Appendix 3: Oil and Gas Resources of the U.S. Outer Continental Shelf

The estimated size of undiscovered economically recoverable oil resources amounts in Appendix 3 assumes that oil is $60/barrel. Resource estimates were also available at $110/barrel but the current price of $80 is closer to $60 than $110; and for most planning areas, the difference in amounts of oil under the two price scenarios is not very large. Interpolation between the two values was considered but rejected because we do not know if the price to resource relationship is linear. The price of oil used to calculate value was a price of $80/barrel which is the current price of oil as of 10/1/10.

Oil reserves are reserves plus reserve appreciation which only exist in areas of current oil production (central and western Gulf and Southern CA).

The estimated size of undiscovered, economically recoverable gas resources assumes the price of gas is $6.41/mcf. The value of gas was calculated at a price of $3.65/thousand cubic feet (mcf) which is the current price of natural gas as of 10/1/10.

Gas reserves are reserves and reserve appreciation which only exist in areas of current natural gas production (central and western Gulf and Southern CA).

See Notes for Appendix 3 for data sources.

Endnotes

[1] Total jobs in tourism and commercial and recreational fishing in coastal counties from Appendix 2. Total jobs in natural resources and mining in coastal counties uses the same database as tourism job numbers. Source: National Ocean Economics Program is a searchable database that allows the user to specify for each state, using coastal counties only, the economic activity such as wages, number of jobs and GDP in each business sector such as leisure and hospitality or natural resources and mining. Available at: http://www.oceaneconomics.org/Market/coastal/coastalEcon.asp

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