

Evaluating the Potential for Offshore Oil and Gas Development in North Carolina

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Abstract

Recurring energy and economic crises promote legislation and government action focused on the development of domestic energy sources to alleviate foreign dependency and create jobs for a rising percentage of unemployed Americans. Within the past year regulatory changes produced the potential for oil and gas production along the outer continental shelf of North Carolina. Exploring the history of development and recognizing existing mandates aid in understanding the full range of issues involved in the offshore leasing and production process.

Examining the six steps of a complete production cycle allows for the outline of activities to provide a clear timeline for the risk of various impacts. Development procedures along the North Carolina outer continental shelf could significantly alter the economic and environmental conditions of coastal communities. Potential impacts are not limited to benefits for the economy and risks for the environment but include trade-offs within each sector. In striving for effective and successful management of offshore resources, emphasis should be placed on finding a balance between growth and stability.

Future research action should emphasize environmental risks and feasibility analysis with a focus on understanding socioeconomic aspects of development. This compilation of necessary information will provide interested stakeholders an available framework for evaluating offshore energy projects using a policy for endorsing responsible and appropriate responses to a national call for offshore oil production. Although development seems to promise economic and energy dependence relief, an increase of detailed information on the conditions of the coastal community and environment will support a determination for best solution to the current crises.

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History of Development

America's oil industry began in 1859 within the rolling hills of Pennsylvania a seemingly unlikely place due to the today's modern market dominance by Texas and Louisiana. (Yeomans 2004) Efforts then moved south where land a production costs were cheaper and oil more abundant. Soon after the move a positive correlation was recognized between proximity to coastal zones and quantity of oil prospects. The first efforts in offshore oil production occurred in the Gulf of Mexico beginning in 1947. Investment and interest in the domestic oil industry continued through the 1950s gaining significant support following the Truman Proclamation and Outer Continental Shelf Lands Act (OCSLA) of 1953. America claimed jurisdiction over submerged lands during these years acquiring the rights to all extractable natural resources such as minerals within the seabed extending out to the continental shelf.

In the decades following these original mandates, significant industry related disasters caused strengthening of environmental legislation and decreased production for field development in America (DOE 2007). In 1969 a well blow-out occurred off the coast of Santa Barbara causing increased concerns about the safety of oil development. This event sparked support of oil spill regulation and research and is believed to have played a role in the adoption of the National Environmental Policy Act of 1970. In response to increased awareness of negative impacts of oil spills in California, Congress placed 736,000 acres off the coast of the central and northern part of the state under an oil exploration and production moratorium in 1982.

After the California event, a task force assigned with studying impacts and risks of the oil and gas industry was formed. Within this research period the most widely publicized oil related disaster in America took place when the Exxon Valdez spilled 10.8 million gallons of oil into Prince William Sound, Alaska (Yeomans 2004). Consequences of the spill were unimaginable by the American public, recording deaths in the thousands for mammals and in the hundreds of thousands for seabirds but none more devastating than the billions of fish eggs destroyed by the slick. Evidence of these disasters induced rallied support for organizations opposed to drilling in ANWR and other undeveloped coastal regions. The most controversial action following the disasters was the decision made by President George H. Bush in 1990 to establish an oil production moratorium to prevent development along the Atlantic and Pacific coasts including

parts of Alaska and Florida (MMS 2008). When Bill Clinton took office he extended the moratorium executive order out to 2012.

The government actions taken during the 1980s and 90s protected regionalized sections of the outer continental shelf (OCS) and coastal environments from oil leases for 18 years until July 2008 when George W. Bush made the executive decision to withdraw the moratorium citing the necessity of expanding the strategic oil reserve (Brahic 2008). Pressure then mounted on Congress for the annual moratorium was up for renewal by September 30th. On October 1st the moratorium expired leaving thousands of miles along America's continental shelves once again vulnerable to oil industry activities. No decisions or guidance was provided before the term of George W. Bush's Administration came to a close on January 20th 2009 (MMS 2009). In the months since Barack Obama's inauguration no definitive answers are available about the future of OCS energy development. Statements released during the Obama campaign and since taking the oath of office emphasize the need for more information to make responsible decisions regarding the management of resources and protection of the environment (Hornick 2009).

Before leaving office the Bush Administration supported provisions for expanding the scope of state control over OCS activities and several bills such as the Grow Americans Supply Act and American Affordable Fuels Act were brought to Congress with sections devoted to establishing the need for expanded leasing. The previous administration showed recent lobbying support for include amendments to the OCSLA for granting state authority for planning and administering energy activities occurring within or adjacent to territorial waters. As of March, no accepted changes to authority or regulation have been achieved and this topic is still wildly undecided.

The state of North Carolina is caught in the middle of this controversy due to its involvement in the moratoria and the stance expressed by the newly elected Governor Bev Perdue. OCS areas of North Carolina were protected until the expiration of the congressional moratorium in October. Well-timed legislation during the 1990s such as the Oil Pollution Act mandating the Outer Banks Protection Act prevented active leases from beginning development and the prohibition of further leasing activities. Since her induction Bev Perdue has not issued a definitive statement on oil development along the OCS but states the need for research at the

state and federal level (Hitchcock 2008). Perdue has been criticized for both promoting and condemning North Carolina's inclusion in active lease consideration while campaigning for governorship. At this point however, Perdue does not have the control to authorize leasing programs but could appeal to the Minerals Management Service (MMS) for consideration of inclusion for the next 5 year energy plan.

North Carolina did experience lease activities along its OCS region during the 1980-90s (DCM 2009). The most significant actions surrounded 21 leases in the MMS exploration unit known as Manteo, bought for \$296 million by companies including Mobil Oil and Marathon Oil. The submerged lands delineated by the lease were located 45 miles from the coast of Cape Hatteras. Sections of the unit were preliminarily approved for exploration plans after multiple suspensions of operation resulting from several requests for scientific and consistency review by the North Carolina Administrators. During the next ten years, from 1990-2000, legislative activities and litigation kept the lease blocks unexplored and the oil companies tied up in court. Due to the framework outlined in the Coastal Zone Management Act, North Carolina was able to effectively prevent oil exploration in the Manteo unit by applying its Coastal Area Management Program objectives and denying the presence of adequate information. All the leases were relinquished in 2000 after the Supreme Court ruled in favor of the oil companies requiring the US Department of Commerce to pay \$158 million for a breach of contract.

Project Motivation

2009 is set to be a year of great change in the United States as a new democratic administration takes office in Washington and begins to tackle the financial and energy crises affecting the majority of Americans. Solutions to these problems must take into account preferences expressed by the public which have shifted due to concerns about climate change, foreign dependence, and sustainability. These interests are not unique to the current situation and have affected policy and action for the last century (Yeomans 2004). However major events of the last 18 months have once again brought them into the spotlight.

Political and environmental arenas are concerned with the vulnerability of the outer continental shelf regions for energy development since the withdrawal and expiration of

exploration and production moratoria last year. In the past eight years federal governance and agencies were modified to follow a political agenda to fight terror and alleviate the deficit created through increased military spending (Brahic 2008). During the later years mandates were passed aimed at augmenting domestic energy supplies for greater independence from global market activities. A new administration took office in January and has yet to provide definitive answers for solving energy concerns of Americans.

North Carolina is one of the states formerly protected by the oil moratoria and its coastal regions could be considered for lease activities in the next federal energy plan (MMS 2009). The structure for authorizing development in waters beyond three miles from the coast is primarily top-down and all permitting power is held by federal agencies. States began formal involvement in the 1970s but hold only limited abilities for affecting development in federal waters. In order to prevent or alter leasing procedures evidence illustrating significant impacts to the state's coastal zone or a statement of inadequate assessment information must be produced.

Coastal tourism in North Carolina is a \$14 billion dollar industry relying on pristine and high quality natural attractions (OBX Chamber 2009). The Outer Banks system represents a nationally recognized vacation destination and its protection is at the forefront of the controversy. Impacts of offshore oil development will effect the economic, social and ecological environments of North Carolina. The acceptance of outer continental shelf production by the state would mean recognizing the trade-offs associated with development and determining a successful balance between ecological protection and economic opportunity (Hitchcock 2008).

Investigation Strategy

The plan for achieving this project consists of an extensive consultation of literature from journals, books, and websites to complete a review and analysis based on academic study. Information on this topic spans decades and this report aims to integrate all relevant information into one reference document. In order to focus on North Carolina, only reports from the Atlantic mid-Atlantic region were used for discussing impacts. As a completed project this report can serve as a comprehensive resource outlining the most significant topics for understanding the issue of OCS oil and gas production.

Objectives for this study include having a comprehensive understanding of the current political and economic situation, recognizing relevant regulations and organizations, and exploring the development process to determine expected impacts. A guide of this type should act as an educational tool for those interested in making informed decisions regarding the appropriate response for determining responsible solutions to the current economic and energy crises.

North Carolina

Containing a population of 8.5 million North Carolina is one of the 16 states making up the Eastern Seaboard and Atlantic Planning region designated by the Minerals Management Service (MMS 2009). The four planning areas along the Atlantic coast are the North Atlantic, Mid Atlantic, South Atlantic and Straits of Florida. North Carolina is in the Mid Atlantic region along with Virginia, Maryland, and Delaware. North Carolina can be broken down into three topographical areas, the mountainous west, central flat Piedmont, and eastern coastal plain sections. Energy development ideas within North Carolina have been considered for each region varying between mining, wind and hydroelectric power, and oil and gas extraction (DOE 2008). Although terrestrial forms of energy production are possibilities, the oil and gas development currently under consideration is marine based with activities along the outer continental shelf.

Of the 100 counties in North Carolina, 20 make up the coastal zone region and are designated authority through the state coastal area management legislation (DCM 2009). Within the jurisdiction of the coastal counties are the Outer Banks, three Carolina Capes, and Pamlico Sound, along with several inlets, extensive estuaries and marshes. The shoreline of North Carolina contains 320 miles of ocean front beaches along with over 3,000 additional miles of tidal coastline (NC MSC 1984). Of the submerged lands surrounding the state, the continental shelf spans 15,000 square miles and estuaries make up 4,650 square miles (most present in Pamlico Sound).

The most famous area of the coastal region is the Outer Banks, a set of barrier islands found off the Northern coast of North Carolina (NC MSC 1984). Outer Banks is comprised of six main islands: Bodie, Roanoke, Hatteras, Ocracoke, Portsmouth and Core Banks and constitute only a part of the entire barrier system. The island chain spans the length of the state

with many uninhabited sections designated as nature reserves or part of the National Seashore. Cape Hatteras and Cape Lookout National Seashore extend along 131 miles of the barrier island coastline managed by the National Park Service and development activities are limited (National Seashore 2008).

Millions of tourists visit coastal North Carolina each year and with the total permanent resident population of the Outer Banks counties recorded at 60,000 leading to some important conclusions regarding tourism (OBX Chamber 2009). Tourism drives the economy of coastal communities with real estate, recreation, and retail accounting for over 50% of the revenue generated annually. Major attractions of the coastal region include ocean front leisure activities, sailing excursions, lighthouses, sport fishing, bird watching, and visiting National and State Parks. Tourists are mainly present between March and October with peak visitation occurring between June and August coinciding with summer vacations.

North Carolina experiences more visitors than human tourists with the migration of other species occurring throughout the year. Sea turtles, marine mammals and sea birds move along and onto the coast during various seasons related to foraging and breeding behaviors (NC MSC 1984). Significant in the attraction of human and animal species to the coast of North Carolina is the presence of the Gulf Stream responsible for transporting warm tropical water from the equator forming the western boundary of the North Atlantic Gyre. These oceanographic features allow for concentrated areas of high seasonal productivity and support a strongly interconnected ecosystem on an ocean basin scale.

Crisis Situation

Economy

Evidence in the financial and investment sectors allows for the speculation that America is in the worse economic crisis since the Great Depression (Economic Recovery 2009). The steady decline began back in July of 2007 and took a major turn in 2008 with financial collapse of major banks and creditors as well as a steep decline in the stock market. Currently the stock market continues to record low values illustrating Americans' unwillingness to invest in the failing economy. Government aid was offered in the bail out legislation of 2008 formally named the Emergency Economic Stabilization Act to make capital injections into banks due to low

returns on assets. A second stimulus granted by the Obama administration is set to be distributed to help cushion the effects of the current recession. The \$787 billion stimulus package was passed by Congress in March with seven major components aimed at providing economic relief, expanded public services, and scientific funding.

Prior to the stimulus the American Recovery and Reinvestment Act was enacted in February as a way to begin efforts for reviving the economy and relaying important information through government media. North Carolina created its own Office of Economic Recovery and Investment in order to help combat the crisis situation. Average national unemployment rose to 8.1% at the end of 2008 up from 6% in 2007 (BLS 2009). North Carolina rounded out almost two percent higher with a record high of 9.7% to begin 2009. It is estimated that over 440,000 work-force eligible North Carolinians are currently unable to find a stable job.

North Carolina is not a rare case as 2008 was plagued with mass lay-off events across all industries nationwide (Economic Recovery 2009). Americans are aware of the economic crisis either directly due to personal unemployment or through rising interest rates effecting mortgages and other loans from creditors, among other factors. Since 2007 the value of disposable income for Americans has exhibited a significant drop and the dollar is weak compared to the foreign currency such as the Euro. It was expressed the only way to get the economy performing again is to increase development and private investment as happened in 1993 under the Clinton Administration (Redburn 2007). The stimulus approach currently being discussed by Congress could be the big public investment plan necessary to jump start failing markets.

Energy

Occurring concurrently and much to the frustration of average Americans is the energy crisis making headlines due to the spike in gas prices during the summer of 2008 (DOE 2008). For a country already experiencing hardship due to lay-offs and declining investment returns, rising energy utility and food cost has been the cause of great alarm. Concerns about energy availability and reliability are not new but are heightened due to circumstances surrounding the exporting countries supply compared to future consumption and production estimates (Hornick 2009).

Since the Arab Oil Embargo of 1973 Americans are familiar with the problems associated with foreign dependency on energy resources (Yeomans 2004). Oil producing OPEC nations banded together in an agreement to not ship oil to countries supporting Israel consequentially raising oil prices three fold causing rapid inflation. Western countries responded by developing policies for energy conservation and increased exploration for domestic energy production. This was a wake up call for the United States to expand efforts in decreasing foreign dependency on oil from the Middle East. Unfortunately though the United States has diversified its sources of imported oil, the percentage of consumed oil from foreign nations continues to rise even as it currently sits at over 60% (DOE 2007). The United States accounts for only 4.6% of the global population yet consumes 25% of the world's oil supply.

Imported oil and gas continues to be consumed due to its cheap cost relative to domestic energy sources of oil (Yeoman 2004). Americans are increasingly concerned about the state of the global energy market both due to the rapid price increase as well as the perception of oil exporting nations being internally volatile and politically unstable. The presence of the United States military in countries of the Middle East has stirred controversy about the continued economic support of nations engaging in domestic and international terrorism and violence activities. An independent task force was formed by the US Council on Foreign Relations highlighting the need for energy security to avoid vulnerability due to dependency resulting in future American deprivation or significant conflict (Hornick 2009).

Primary solutions for resolving the energy crisis include expanding current generation activities and developing underutilized markets for production (DOE 2007). Deep ocean extraction in the Gulf of Mexico and claiming Federal lands in the Western US for oil and gas exploration are two examples of expanding activities while OCS energy production off the Atlantic and Pacific coasts represent new practices. Through a series of public participation surveys evidence shows that the majority of Americans are in favor of expanding domestic oil and gas production. North Carolina residents recorded 54 % in favor of offshore drilling when polled in July 2008 (Fuquay 2008).

Due to government issued statements and oil industry press releases, Americans are bombarded with information supporting domestic energy production on the OCS as a way to

solve the economic and energy crisis (Hitchcock 2008). With reference to the recent Deep Ocean Energy Resources Act of 2008, oil production is safe due to extensive research and development of recent decades and has the potential to lower energy costs, create a reliable energy market, generate significant job creation, and spur economic growth and prosperity through revenue sharing programs (MMS 2009).

Buying American has become an interest for all citizens due to domestic economic hardships perceived to be the result of companies outsourcing labor or moving production activities overseas (Yeomans 2004). Dedicated to this notion of patriotism the Grow American Supply Act and American Affordable Fuels Act are two bills introduced to Congress in 2008 pushing for amendments to the OCSLA to allow for state control over leasing activities (Stoleberg 2008). Most Americans would argue the importance of activities to boost economic production, financial investment, and lower the cost of necessities such as utilities and food products. Domestic production within the OCS regions might provide the means to reach that end but it is important to discuss and explore all the potential impacts and consequences before choosing a course of action.

Regulatory and Legislative Actions

Significant legislation enacted for the protection of North Carolina from federally authorized OCS development includes national laws and state regulations. Some of these affect a wide scope of projects while others are more specified to the Outer Banks region or for certain special interests. The following are seven mandates of the greatest significance for regulating energy development activities within North Carolina's OCS region.

National Environmental Policy Act 1969

NEPA is considered to be the main driver of all environmental legislation passed since it was enacted in 1970 (Cincin-Sain 2000). This act requires the incorporation of environmental values into proposed activities in order to seek out comparative alternatives with less negative impacts. Strength of the legislation lays in the requirement to draft and submit environmental impact assessments and statements for review by the EPA before any major action can be authorized.

Outer Continental Shelf Lands Act 1953

This law controls and authorizes the activities along the east and west coasts of the United States. OCSLA grants discretionary power to the Secretary of the Interior over energy extraction projects on the shelf. It also mandates a task of creating five year programs and energy initiatives for the MMS to ‘balance development and environmental safeguards for state and federal interests.’ (MMS 2009)

Coastal Zone Management Act and NC Coastal Area Management Act

The CZMA is intended to create more integration across jurisdictional boundaries for management of the coastal zone (Cincin-Sain 1998). North Carolina followed the procedures outlined in the CZMA and formed its own management plan enacting CAMA. This state permitting process framework considers environmental impacts for projects within the North Carolina’s coastal zone and granted authority to the Division of Coastal Management. Since its introduction the CZMA was amended to include the Coastal Energy Impact Program and a Federal Consistency Review to further protect the well-being and consider the interests of state governments by funding support programs for protecting coastal communities and state objectives.

Oil Pollution Act 1990

Following the various oil spill disasters, a concern over the need for more organized emergency response began to emerge. The OPA mandates all production activities to have a contingency plan before development or transportation occurs in waters of the US (Cincin-Sain 2000). Another requirement called for the designation of ecologically sensitive areas and mandated the preparation of monitoring and assessment plans for those sections of habitat. In conjunction with the OPA, the Outer Banks Protection Act was enacted to prevent any leasing or development activity for one year until more information became available however this act was later repealed and is no longer authorizing.

Energy Policy Act 2005

One of the more recent acts passed in 2005, this act promotes an increase in biofuels while also supporting growth of oil and gas development in the Gulf (DOE 2007). Tax breaks

and incentives are mandated for conservation efforts along with the creation of subsidy programs to aid alternative energy generation such as wind, tidal, and geothermal development. In particular it targets the outer continental shelf through an expedited process for leasing and production of other sources of energy besides oil and gas. Although it seems to be acting counter to the interests of the oil and gas industry, provisions are included to exempt drilling activities from requirements of the Safe Water Drinking Act.

Deep Ocean Energy Resources Act 2008

Recently enacted the Deep Ocean Energy Resources Act has several key components worth discussing. The main point of this act was to enable states to have more power over leasing activities in waters adjacent to the coastline. This act prohibits the President from withdrawing state managed areas from oil leasing and allows states to authorize development activities independently from neighboring authorities (HR 6108 2008). Under this law the 5 year plans must include at least 75% of the non-leased land within each OCS planning area eligible for oil and gas development. Lastly this act provides an amendment to the OCSLA promoting the Rigs to Reefs Act 2008 to allow decommissioned platforms to serve as artificial reefs to provide for scientific research and ecosystem services.

Additional guiding regulations and executive orders provide for more detailed management of single resources by tackling the issues of pollution, disturbance, and species populations. The mandates being considered relevant to oil and gas development on the North Carolina OCS exhibit the range of special interest issues.

Some actions represent guidance for supporting education and research activities like the National Historic Preservation Act relevant to North Carolina due to the presence of the sunken USS Monitor offshore of the Outer Banks (Cincin-Sain 2000).. Other regulations created the Sea Grant Program enabling universities to participate in projects aimed at promoting stewardship and responsible uses of coastal and marine resources. The passing of the Clean Air and Clean Water Acts meant that projects to set national standards were necessary for allowing future activities to continue. Both of these acts have strong requirements for promoting education and supporting scientific studies working toward mitigation of negative impacts and innovation to improve best management practices.

Species specific acts came to be the focus of environmental lobbying efforts and the most commonly recalled is the Marine Mammals Protection Act. This act deals specifically with marine mammals and protects them from any take or harassment and prioritizes habitat preservation above other anthropogenic uses. Similarly the Endangered Species Act worked to promote the survival of endangered and threatened populations on a species level. If a species is listed, recovery plans for the population are required typically protecting foraging and breeding habitats to improve, stabilize, or prevent further population decline. Requirements under the Fishery Conservation and Management Act follow along the same lines with provisions to implement fishery management plans to protect fish stocks. However due to fish being a market commodity other terms include the requirement for foreign vessels to obtain permits and to have an observer aboard to record catches. The last action to discuss for this type of development is the Coral Reef Protection Executive Order. In this order President Clinton created the US Coral Reef Task Force with the goal of conserving reef ecosystems through intense protection procedures with continued monitoring and overall program evaluation.

All of these acts are important for consideration because information will be required for permitting by the EPA, US Fish and Wildlife, NOAA, and Coast Guard. Moving forward or preventing the development of the OCS region will depend on the results of the research and assessments mandated by these regulations.

Organizations and Government Advisory Groups

The mission statements of the many groups with invested interest into aspects included for consideration when discussing OCS development in North Carolina emphasize a variety of concerns. Organizations considered focus efforts towards fisheries, coastal protection, water quality, wildlife preservation, environmental aesthetics, economic development, and the importance of oil and energy. This list of organizations is not exhaustive but depicts the range of stakeholder interests and the issues for consideration when researching impacts. Located in Appendix II is a complete list of the organizations mentioned along with contact websites for further information.

Some of the groups working for both protection and consumption of resources on a national and/or international scale are the National Resources Defense Council, Pew Oceans

Commission, American Petroleum Institute, Domestic Petroleum Council, Independent Petroleum Association of America, International Association of Drilling Contractors, Environmental Defense, National Ocean Industries Association and Wildlife Federation.

For a regionalized and state scale focus several organizations are active on a more localized level. Some of these include the Coastal States Organization, National Mid-Continent Oil and Gas Association, Green Power, Coastal Conservation Association, Coastal Federation, Conservation Council, and Conservation Trust. The last few to mention are state specific organizations and North Carolina government agencies responsible for guiding activities within coastal waters. Although not the only agencies involved Environment North Carolina, Division of Marine Fisheries, Coastal Resources Commission, and Environmental Management Commission represent some of the most influential and primary contacts for information about regulations and permitted actions.

Development Process

In order to fully understand the timing and scope of impacts this section will discuss a basic summary of the activities occurring at each stage of the process. The process can be broken down into six stages: 1) pre-lease 2) leasing 3) exploration 4) field development 5) production and 6) shutdown. *A Guide for Local Planners* (Brower 1981) publication distributed by the Office of Coastal Management was used for determining the development process and supplemented with Virginia lease workshop information available through the MMS (2008).

Pre-Lease

In the planning stages of OCS development action is taken to gather information about the physical characteristics of submerged lands. Using these data accounts, scientists are able to locate blocks showing evidence of resource reservoirs. The most commonly employed pre-lease study is the seismic survey.

To conduct a seismic survey a ship towing signal-generating and recording equipment travels along a predetermined grid within the area of consideration. The signals generated are a series of short pulses traveling to the ocean floor then reflected back toward the surface and detected by the recording hydrophones. These sonic wave patterns allow onboard computers to

generate a bathymetric model of the underlying rock formations. From this data, geologists and other oil exploration specialists can determine possible structural and stratigraphic hydrocarbon traps. Often these surveys are coupled with a collection of shallow cores obtained from the ocean floor to inform engineers on the age of the rock, structure of rock layers, and mechanical properties of the substrate. Seismic surveys are overseen by the Geological Survey, Coast Guard, and Army Corps of Engineers. When conducted under established regulations the surveys have no impact on living resources within the study area.

Leasing

During this stage most of the potential impacts would stem from encouraging local and regional participation which could cause conflict or the creation of community identity. Information gained from public individuals is used for consideration in the assessments and studies carried out to support the lease sale. This stage is mainly responsible for generating the following documents:

1. environmental baseline studies
2. resource reports
3. call for nominations and comments
4. tract selection
5. tentative announcement of tracts
6. stipulation meetings
7. oil spill models
8. public scoping meetings
9. draft environmental impact statements
10. public hearing
11. final environmental impact statements
12. secretarial issue document
13. proposed final notices of sale
14. lease sale
15. environmental monitoring studies

Exploration

Before any drilling can take place the oil company must prepare an exploration plan outlining all activities to be performed for submission to the Geological Survey. Any reports and assessments completed for the development process are eligible for consistency review in addition to public hearings that can be held to discuss the content and development procedures. Certification of compliance by the state is required before going forward with any exploratory actions.

Information gathered during the exploratory stage is used to determine the timing and scale of the development and production stages. Through various survey techniques data acquired provides figures on the commercial qualities of potential hydrocarbon fields. Exploration may determine significant sources of oil and natural gas which brings forth the field development phase or if reservoirs are absent or small the exploration typically expires 5-7 years after lease sale.

Exploratory Drilling

Lessees are granted exclusive privileges to explore the tract in a diligent and organized manner by drilling, extracting, and disposing of oil and gas deposits. These wells are drilled to retrieve samples to estimate the location and quantity of extractable oil and gas within a reservoir area. Semi-submersible drilling rigs are commonly employed for OCS exploration due to designed depth and dynamic movement abilities.

Efforts during the exploratory stage are managed by the Geologic Survey for approving plans, permitting, and monitoring drilling activities. The EPA is brought on board to issue pollution control permits while the Army Corps of Engineers and Coast Guard are on hand to regulate the navigational aspects of the project. The exploration phase marks the beginning of onshore facilities development activities. Siting of the service support structures is the responsibility of the local and state agencies and the companies typically tend to use existing facilities such as harbors and repair centers for temporary service bases. Capital investment in onshore development is minimal until extractable reserves of hydrocarbons are discovered.

Field Development

If the exploration data shows evidence of commercial quantities of extractable oil and gas the oil company will generate a development plan based on the timing estimates and market assessments determined during the exploratory stage. Transportation plans are created based on the preferred method of bringing oil and gas to shore normally either by pipeline or tanker. These plans must be submitted to the federal government for permitting and review in order to protect marine navigation lanes and environmental quality. Assessments during this phase provide more accurate information for evaluating environmental impacts for both onshore and offshore facilities. During this stage the actual siting procedures take place to delineate coastal lands for

support bases, storage areas and refineries and to determine the best location for any offshore platforms.

In the development drilling process the production wells are established by employing fixed platforms attached to the sea floor as permanent fixtures during the life of the field. These platforms can vary in design and components based on the characteristics of the submerged land, local climate, ocean temperament and expected number of wells. Directional drilling allows for dozens of wells to be drilled from a single platform. After each well is drilled it is sealed with concrete to wait for the production stage once all onshore facilities and transportation plans are finalized.

Once all the wells, pipes, tanks, and processing facilities are in place a flushing of the well is performed to remove residual drilling mud. Explosive charges are set off through the cement casing to allow the oil and gas to flow into the production tubing within the well bore. The rate of flow is controlled and oil and gas is directed into processing centers within the platform. After this process much of the platform is disassembled to make room for the production equipment. A process known as 'workover' is carried out periodically throughout the life of the wells. Basically a workover involves repeating the procedures for opening the wells due to clogs and to perforate deeper into bedrock. A variety of permitting activities take place during the field development phase involving the Geological Survey, Coast Guard and Army Corps of Engineers in order to move forward.

Production

This stage formally begins when oil and gas are extracted, transported to shore, and processed in the onshore facilities for the commercial market. Exploratory drilling and field development do not need to end for production to begin and often all three stages are occurring simultaneously within a lease block. Production tends to peak within the first four to five years of extraction with the constant addition of new wells through time. Procedures of resource recovery become more costly and technically difficult and production steadily declines requiring the employment of more aggressive extraction techniques to balance production rate and expended effort. During production communities can benefit financially through taxes, but might

not offset the costs of supplying onshore amenities during the construction induced population influx.

Shutdown

Eventually production potential of the OCS units reaches exhaustion and extraction is no longer economically feasible. At this point companies are required to decommission both onshore and offshore facilities by plugging wells, removing platforms, and abandoning, dismantling, or converting service bases. Typically companies are granted three years by the Coast Guard and are monitored by the federal government to ensure proper procedures for sealing wells and removing marine debris. Offshore oil and gas fields are short-lived projects and communities should consider attracting other industries to provide for a diversified industrial economy to minimize depression of the local economy when production inevitably declines.

In recent years a rigs to reefs program began as a way to transition the disturbed areas to biologically productive ecosystems through the creation of artificial reefs (MMS 2008). Following the procedures of the program abandoned platforms are toppled into the water to prevent any navigation hazards and serve as additional hard substrate in the OCS environment. These projects have seen success in the Gulf of Mexico and could be an option in the Atlantic region.

Impact Advisory

Impacts presented in this section represent potential effects of the cumulative development process following an exploration and production scenario. All discussed impacts reflect information presented in technical workshop data compiled during the period of Manteo leasing and current Virginia lease projects (MMS 1998 and 2008) due to the limited history of offshore activities along the Atlantic OCS and complete lack of any offshore development in North Carolina. These reports include evaluations by experts across physical and social science fields however only official and final documentation were used for this project. Information gathered during the Manteo lease is dated and coupling these findings with the ongoing data collection on the proposed Virginia leases provide a more comprehensive understanding of modern environmental and economic concerns for Atlantic coastal states.

Offshore oil and gas development activities will include impacts on both the onshore and marine environment. Coastal communities considered attractive to the industry and private companies are generally equipped with existing support facilities and exhibit room for expansion (MMS 2008). Available land should be easily accessible and connected to primary thoroughfares and basic utilities. These lands should allow for the creation of service bases which operate 24 hours a day able to accommodate constant shipping by trucks and boats.

Important considerations are the safety precautions requiring the bases and offshore platforms to be constantly lighted and maintained through painting and cleaning efforts. Noise generated at the various facilities can range from 80-115 decibels due to the employment of pneumatic power tools, air compressors, pumps, heavy machinery, and generators. These sounds are not only a consideration on land and over water as pipeline compressors will continuously generate noise underwater known to be audible beyond a one mile radius. However as with most compressing equipment silencers are available for mitigating the effects of the sound.

Beyond lights and noise other aesthetic impacts include the creation of large expanses of industrial park near the ocean front (MMS 1998). Most development occurring in these areas consists of million dollar homes, resorts, and national parks. Buffer zones are typically created for the transition from residential to industrial zoning however some of the fabrication activities will require structures standing over 200 ft high to be present. Besides the potential for onshore visual blights, the offshore structures will not be visible from shore as the OCS is at least 20 miles from any part of North Carolina.

Marine Transportation

Impacts effecting operations and existing industries include marine transportation considerations. Vessel traffic will increase putting greater pressure on port facility monitoring agencies such as the Coast Guard. Additional presence of the Federal Government could coincide with limited or restricted access of previously unregulated spaces. These changes should be expected and might conflict with the military activities prevalent in coastal regions of North Carolina. In order to avoid collisions or interactions shipping lanes might be modified spatially, temporally to decrease night traffic or even in regard to speed. Increased vessels passing through North Carolina ports and along the coast could present an opportunity for

invasive species introduction and necessary procedures should be established to prevent detriment to the natural environment.

Light and Noise

Some disturbances such as the introduction to constant light and noise from facilities both onshore and within the marine environment can have significant impacts. Lights present on platforms and buildings could disorient nocturnal seabirds and prey leading to modification of feeding behavior through unnatural congregations of both resources and predators. Artificial lights are known to confuse sea turtle hatchlings from migrating seaward causing increased predation, dehydration, and overall mortality. Other species thought to be attracted to lighted structures include juvenile sperm whales however this is inconclusive because the cause could be related to high squid concentrations found beneath platforms.

While lights tend to have the effect of attracting species, noise disturbance seems to lead to avoidance tactics. Whales have exhibited altered foraging behavior thought to be caused by noisy drilling operations and will abandon previously significant feeding areas. Documented strandings and beaching of whales have occurred following seismic activities however the direct effects of development activities on even sensitive species are recorded as minimal or temporary. Noise has been tied to modified behaviors of migrating and resident bird populations near onshore industrial activities. Changes in flight paths, foraging areas, and breeding grounds have been caused by the introduction of loud machinery and traffic.

Discharges

Pollutant discharges occur constantly throughout the life of the oil and gas project. Most emissions are monitored to protect the integrity of the water and air and permits must be obtained following the standards set by the Clean Air and Clean Water Acts. Expected discharges include waste water, greenhouse gases, and toxic chemicals in the form of drilling muds and contaminated cuttings. Pollution entering the immediate vicinity of the platform and offshore apparatus could be chemical, physical, and thermal in nature. Modifying the temperature, chemical makeup, and physical structure could have direct effects on the biological integrity of the ecosystem.

Drilling occurs over a long period of time and requires the cutting of many wells from a single site creating higher concentrations of drilling mud and cuttings. Wastes during drilling are often a mixture of petroleum, brines, and significant amounts of sulfur. The disposal of large quantities of particulates, heavy metals, and anti-fouling chemicals on the OCS sea bed can smother habitats, and increase toxicity near the platforms. Chemical changes in the water column during pipeline installation and pipelines are expected to leak small quantities of hydrocarbon gas, sulfur oxide, and nitrogen oxide when gas is moving to processing facilities.

The greatest impact of pollutant discharges would be an uncontrolled blow-out occurrence or catastrophic oil spill. In the event of a major accident the addition of large amounts of hydrocarbons and liquid petroleum could have unknown consequences due to the proximity of the Gulf Stream and the presence of strong seasonal fronts effecting marine processes. If a spill occurred seabirds and mammals are expected to be severely impacted due to foraging strategies and year round residency of several populations. Fish in egg or larval stages recorded the greatest population percentage mortalities in past oil disasters. Effects of uncontrolled pollutants could stunt or even halt the recruitment if discharges infiltrate coastal marshes and estuaries.

Depending on the time of year risk assessments for impacts on sea turtles would be variable given the lack of residency off the North Carolina coast. In the event contaminants are transported by the Gulf Stream effects could be devastating for at least 2 of the 5 Atlantic species as it serves as a major migratory pathway. Sea turtles could be indirectly affected if pollutants enter the sargassum, a marine grass necessary habitat for foraging by altering natural ecosystem processes.

Infrastructure

Prior to any production action impacts of construction are experienced through the creation of infrastructure both onshore and offshore. Most of the infrastructure is built during the field development stage however in order to begin the process of development certain support bases such as ports, maintenance yards, and fueling stations must be accessible. Expansion of coastal road systems including highways and bridges could be required for transporting service vehicles and construction equipment. Coastal support bases as mentioned earlier will need to

accommodate additional vessels, 24-hour service needs, and stress on utilities such as waste disposal.

Other infrastructure will need to be introduced to the region such as pipelines for the transport of natural gas and offshore platforms for extraction. Trenching and drilling techniques for installing the infrastructure cause disturbances by removing and destroying ocean bottom habitat through displacement of substrate and burial of sessile species. These additional marine obstacles could modify the behavior of marine species acting as an artificial reef structure aggregating individuals and aiding biodiversity efforts to protect the offshore ecosystem.

Depending on the type of platform and the placement of benthic pipelines these installations could force a change in fishing behavior to avoid gear interaction. Trawling activities are limited by benthic infrastructure and spatial conflict for fishing grounds could occur during various stages of development. After platforms are installed a safety zone is established where fishing activities and unauthorized access is prohibited. However once the production stage is completed if the platform is left for artificial reef the development could provide enhanced fishing efficiency due to increased concentrations of populations.

Socioeconomics

Economic growth is expected through the introduction of industrial companies to support the development activities. Additional industry coincides with increased revenues as the tax base expands to include property taxes and the leasing or purchase of land. Industry creation translates into more employment opportunities especially during the exploration and field development stages when most of the construction on infrastructure and support bases is completed. In order to allow this development to take place coastal communities will need to provide an increased amount of public services including schools, waste management, utilities, and medical care.

Depending on the amount of leases and magnitude of recoverable oil and gas, 100-350 jobs ranging from unskilled to highly technical could become available in coastal communities. Potential jobs would include onshore support technicians, platform specialists, contract service crews, and marine personnel. Job creation at service bases for supporting the operations of the exploratory crew and most could be filled with the local labor force if available. However these positions are only temporary and would provide short-term relief on the order of 5-10 years.

Coastal communities will be relied on to provide workers to complete a new industrial center for platform fabrication, pipeline assembly, installation bases, processing facilities, and refineries especially for oil and gas field located far from an existing large harbor. It is the creation of these onshore facilities which will make many more jobs available once production of oil and gas begins.

After the initial construction of wells, fewer than 20 jobs will exist carrying out maintenance activities on the platforms but once production begins a larger crew will once again be necessary typically involving around 100 individuals. An important consideration is the competition for higher paying construction jobs drawing individuals away from existing commercial industries. This type of development activity due to its intense implementation process could lead to economic dependence and a strategy should be devised for how coastal communities will cope with shutdown and abandonment.

Research Funding

Although most impacts addressed were direct effects on economic and environmental conditions one indirect effect of significance is the role of surveys and monitoring on the academic community. Scientific research is expensive and funding is limited causing many areas such as the North Carolina OCS region to go unexplored. If oil and gas development was initiated the Federal government and the oil companies would be required to collect data for environmental impact statements, exploration permits, and production activities. Necessary baseline analysis such as geologic modeling, bathymetry determination, oceanographic processes, biological assessments, and productivity evaluations would all be required. Results presented in the EIS and permitting applications could provide significant research data for use by the academic communities of North Carolina for understanding the oceanographic, ecological, and socioeconomic conditions of the shelf region, near shore environment and coastal communities.

Summary

In 2008 citizens across the US watched gas prices and unemployment rates hit record levels all the time knowing America's dependency on foreign sources of labor and petroleum has sparked a national call for the development of new domestic markets. Determining an

appropriate course of action for securing stable energy production and a strong economic future is the task of managers at all levels and locations.

As the Obama Administration settles in and begins to attack the economic and energy crises facing America and the world, statements about the future of the Atlantic OCS region will be decided. Due to the expressed interests of President Obama and Secretary of the Interior Salazar it is expected that future energy initiatives will aim to establish efforts for renewable and sustainable domestic energy sources (Hornick 2009). The Obama Administration stresses the idea of limited oil development and employing an environmentally responsible course of action. Future MMS energy program efforts for North Carolina OCS energy production could include alternative generation sources such as wind or ocean-based power. Alternative energy development could represent a solution to the economic and energy crisis with less risk than oil and gas production.

The development process is a multi-step procedure with known associated risks to existing environmental and economic conditions. In initiating leasing and exploration activities no guarantees are provided that economically extractable resources will be present. North Carolina is not currently considered in the MMS 5 year plan and the process of inclusion could take five or more years (MMS 2009). Following this delay would be the leasing process taking, on the average, 3-5 years and only then would any industry activities be introduced to the coastal communities. Even if the process begins today, production if any occurs, would not begin for at least a decade, however the risks to coastal ecosystems and economic security begin when monitoring equipment is first submerged during prelease surveying. Oil and gas development will not provide immediate relief of the economic and energy crisis but if efforts are successful, the development could secure a domestic supply will be available to Americans in 15-20 years.

Significant impacts to the environment and economy are expected throughout the duration of the OCS development process. Environmental impacts fall into two categories pollution and disturbance. Pollution deals with discharges associated with development activities and generally include the introduction of chemicals or waste into the air and water. Disturbance impacts are less tangible and involve understanding how structures and processes alter the behavior of species and natural progression. Economic impacts of oil and gas development

include the possibility of modernizing infrastructure, expanding revenue base, and creating employment positions within coastal counties. The socioeconomic effects will occur over time in disproportionate amounts throughout the length of the development process (MMS 2008). Large investment sums totaling in the millions are required before any activity takes place and profits from production are delayed on the order of decades. These are important considerations when assessing the ability of coastal communities to support this type of industrial development.

In discussing the potential risks and known impacts of oil and gas activities, both positive and negative effects are expected regarding environmental quality and economic security. Trade-offs are present and must be considered when deciding a course of action. In this instance not all impacts will be negative for the environment and in contrast not all economic changes are necessarily positive throughout this process. To achieve successful management of the North Carolina OCS region, objectives must be clearly outlined and a balance reached between the various aspects of protecting environmental quality and securing the economic future of the coastal communities.

By expanding production to new areas such as the Atlantic OCS the MMS program could potentially double the percentage of domestically supplied oil and natural gas (HR 6108 2008). The development process is discussed as a linear process for this evaluation however it is crucial to understand development may only be partially completed or will entail some cyclical or circular progression. Renewed interest due to the lifting of the moratoria should provide the opportunity and support for research project funding aimed at a greater understanding of the OCS processes including traits of the Gulf Stream, movement patterns of nutrients and species, and effects on existing commercial industry (NC MSC 1984).

Looking Ahead

Unstable prices of oil and gas along with concerns about climate change are driving Americans to consider conservation as a way to combat the energy crisis (DOE 2008). Environmental organizations focused on both coastal protection and resource conservation rally support in North Carolina and across the country. Citizens of coastal counties know the value of the pristine ocean view and the introduction of efforts preventing its preservation will incite opposition. Ocean front communities within the Outer Banks Islands consist of land of high

property value and million dollar homes. The perceived risk of an oil disaster could result in property value decline if offshore and onshore facilities are sited within the vicinity (Holing 1990). Effects of this type have currently gone unexplored and represent only one of many problems worth considering before moving forward with any OCS efforts.

Offshore oil development could provide coastal North Carolina with sought after economic and energy solutions, however it may be important to evaluate willingness to pay (Hitchcock 2008). The costs associated with development centered on resource production within the most economically valuable region of the state could stage a trade-off between the current non-consumptive tourism industry and a potential extractive energy industry. It is important to discover what this transition will mean for the local communities and protected areas spanning the length of the Outer Banks.

After completing this evaluation of the current conditions and policies affecting OCS development with consideration of documented potential impacts, managers of coastal communities would benefit from two studies (Beatley 2002). One of the studies is quantitative in nature and focuses on purely economic and scientific data while the other is a qualitative survey. The first is best described as a compound risk assessment but could take the form of a complex cost benefit analysis for determining a statistical best course of action. Due to the many stakeholders and importance of expressing all factors, even environmental quality numerically this study will be plagued with the problems of unknowns and uncertainties. The qualitative survey recommendation is for understanding public perception of both the economic and energy crisis and calculating willingness to pay for its resolution. Information on the local general public is valuable to administrators for making best management decisions resulting in effective and accepted policies.

Management

The fate of domestic oil development currently rests in the hands of Congress as lobbying efforts continue to rally support for both side of the issue (Brahic 2008). Decisions made within the next year could determine the path of energy development for decades ahead. Structural and procedural changes could shift authority, establish a new regulatory body, or reinstate moratoria. Several Federal and State commissions, and committees have been appointed within the past six

months tasked with collecting and analyzing socioeconomic and biological information in order to provide Congress with guidance deciding authority for regulating offshore activities (MMS 2009). Any activities occurring within the Atlantic planning areas in the near future will be managed by the Gulf of Mexico planning administrators until a regional office is established.

Two management styles worth considering here due to recommendations by national committees and agency councils are known as integrated and adaptive. In the existing structure techniques channeling these approaches are present and several agencies claim procedural operations based on style guidelines (Cincin-Sain 1998). Deciding a best management plan for future OCS activities should involve the integration of government both vertically and horizontally along with the inclusion of interested stakeholders. Encouraged participation should include allowing for introduction of information and cooperative authority in accepting or rejecting proposals. Adaptive management techniques are designed to create procedures with the ability to change due to updates through monitoring of policy actions. For OCS development certain unknowns and uncertainties are difficult to overcome and exercising a flexible approach will allow processes to move forward. Adaptive management could provide the best solution for moving forward with caution, having concern for exploring and evaluating impacts for short-term and long-term objectives along with establishing monitoring standards for the development process.

Conclusions

The fate of North Carolina's outer continental shelf will be determined by Congress and federal cooperating agencies working toward securing energy resources for future Americans. President Obama has the ability to play a major role by issuing a new moratorium and has already contributed to the management of OCS regions through the appointment of Ken Salazar as Secretary of the Interior. Due to the instatement of the moratoria in the 1980s the Atlantic and Pacific seaboard allowed the issue of OCS leasing and development to disappear from the limelight. In the years passed since the leasing activities in North Carolina during the 1980s significant innovations for alternative energy generation occurred meaning the harnessing of wind and ocean based energy might be considered in lieu of oil and gas production.

An effective assessment of the impacts on the coastal environment and the economy is a seemingly impossible task due to the lack of socioeconomic information and dated ecological evaluations. Considerable innovations in scientific research occurred since data was last collected for leasing and exploration activities and new studies need to be conducted using satellite technology and highly sensitive monitoring apparatus. Demographically the population of coastal North Carolina has gone through some changes in recent years as the service economy has grown.

Certain beneficial information which would have been helpful will become available in the near future as the appointed commissions for evaluating offshore energy along the Atlantic and specifically North Carolina begin to report findings. The first group responsible for communicating results will be the Advisory Subcommittee on Offshore Energy Exploration assigned the task by Governor Perdue to show findings by May 2009.

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Appendix I

Maps



Figure 1: Current Leasing Plan illustrating eligible and withdrawn areas after the moratoria suspension in 2008 www.mms.gov

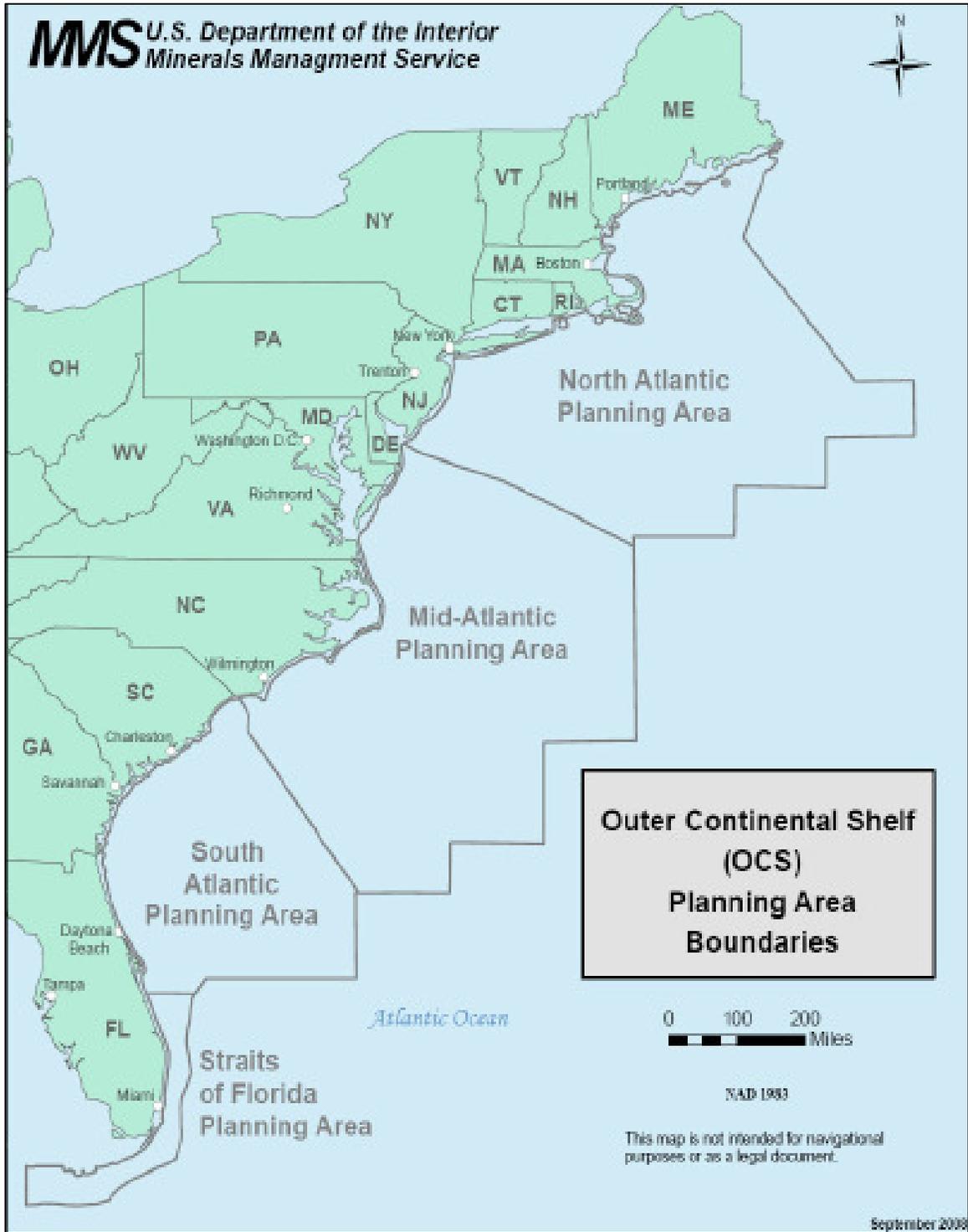


Figure 2: Minerals Management Service Atlantic Planning Region www.mms.gov

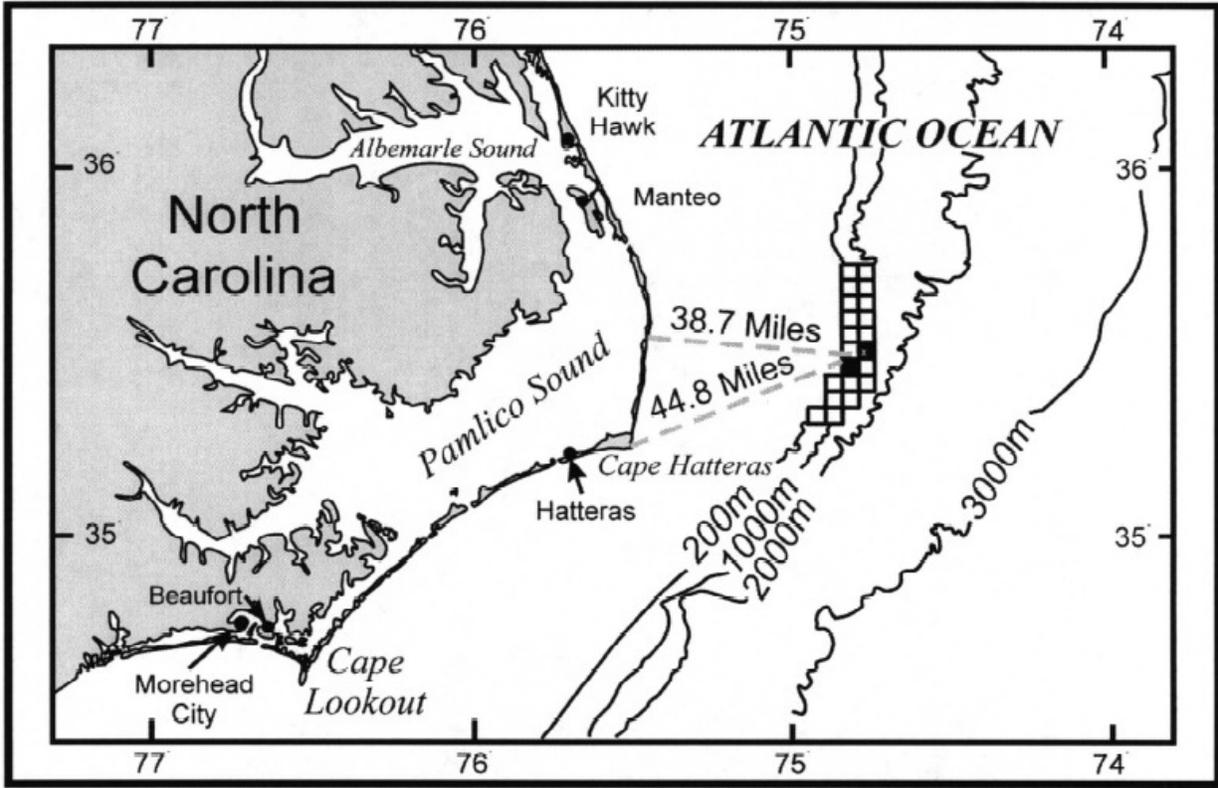


Figure 3: Schematic of Manteo Exploration Unit Offshore North Carolina www.mms.gov

Appendix II

Government Agencies

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| Army Corps of Engineers <i>Headquarters, USACE 441 G Street Washington, DC 20314</i> | www.usace.army.mil 202-761-0011 |
| Coast Guard <i>Commandant, U.S. Coast Guard 2100 Second Street, SW Washington, DC 20593</i> | www.uscg.mil 202-372-4411 |
| Department of Energy <i>1000 Independence Ave., SW Washington, DC 20585</i> | www.energy.gov 800-342-5363 |
| Environmental Protection Agency <i>Ariel Rios Building 1200 Pennsylvania Avenue, NW Washington, DC 20460</i> | www.epa.gov 202-272-0167 |
| Fish and Wildlife Service <i>1849 C Street, NW Washington, DC 20240</i> | www.fws.gov 800-344-WILD |
| Minerals Management Agency <i>1849 C Street, NW Washington, D.C. 20240</i> | mms.gov 202-208-3983 |
| National Oceanic and Atmospheric Administration <i>1401 Constitution Avenue, NW Room 5128 Washington, DC 20230</i> | www.noaa.gov 301-713-1208 |
| National Marine Fisheries Service <i>Partnerships & Communications 1315 East West Highway Silver Spring, MD 20910</i> | www.nmfs.noaa.gov 301-713-2334 |
| National Park Service <i>1849 C Street NW Washington, DC 20240</i> | nps.gov 202-208-6843 |

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| Department of Environment and Natural Resources <i>1601 Mail Service Center Raleigh, NC 27699</i> | www.enr.state.nc.us 919-733-4984 |
| Division of Coastal Management <i>400 Commerce Ave Morehead City, NC 28557</i> | www.dcm.enr.state.nc.us 888-4RCOAST |
| Division of Marine Fisheries <i>3441 Arendell St Morehead City, NC 28557</i> | www.ncfisheries.net 252-726-7021 |
| Department of Tourism <i>301 North Wilmington Street Raleigh, NC 27601</i> | www.visitnc.com 800-visitnc |
| Governors Office <i>Governor Bev Perdue 20301 Mail Service Center Raleigh, NC 27699</i> | www.governor.state.nc.us 919-733-4240 |
| Outer Banks Chamber of Commerce <i>101 Town Hall Dr Kill Devil Hills, NC 27948</i> | www.outerbankschamber.com 252-441-8144 |
| <i>Selected Active Organizations</i> | |
| National Resources Defense Council | www.nrdc.org |
| Environmental Defense Fund | www.edf.org |
| Pew Oceans Commission | www.pewtrusts.org |
| Coastal States Organization | www.coastalstates.org |
| North Carolina Coastal Federation | www.nccoast.org |
| Coastal Conservation Association (North Carolina) | www.joincca.org (www.ccanc.org) |
| Conservation Council of North Carolina | www.conservationcouncilnc.org |
| Wildlife Federation | www.wildlifetrust.org |
| Conservation Trust for North Carolina | www.ctnc.org |
| North Carolina Green Power | www.ncgreenpower.org |
| Environment North Carolina | www.environmentnorthcarolina.org |
| Coastal Resources Commission | www.nccoastalmanagement.net |

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|---|---|
| Environmental Management Commission | www.enr.state.nc.us (919-807-6457) |
| National Ocean Industries Association | www.noia.org |
| American Petroleum Institute | www.api.org |
| Domestic Petroleum Council | www.dpcusa.org |
| Independent Petroleum Association of America | www.ippaa.org |
| International Association of Drilling Contractors | www.iadc.org |