# CHAPTER 24:
# MANAGING OFFSHORE ENERGY AND OTHER MINERAL RESOURCES

*Chapter 6 addressed the complexities associated with developing a coordinated offshore management regime and recommended one that is among other characteristics: comprehensive, transparent, and predictable; brings a fair return to the public; and promotes a balance between economic and environmental considerations. Activities related to the management of nonliving resources in federal waters are inextricably linked to many of the fundamental policy questions raised by that discussion. From the politically contentious but administratively mature outer Continental Shelf (OCS) oil and gas program to the new and emerging offshore uses that lack coordinated and comprehensive regimes, much can be learned. But much still needs to be understood about what it may take to develop a system that unlocks the treasures of the sea while protecting the marine environment and providing all affected parties a voice in the decisions that manage that process.*

## EXERCISING JURISDICTION OVER NONLIVING RESOURCES IN FEDERAL WATERS

In addition to its responsibilities for living marine resources, the federal government also exercises jurisdiction over nonliving resources, energy and other minerals located in the waters and seabed of the more than 1.7 billion acres of the outer Continental Shelf (OCS). Offshore oil and gas development has the most mature and broadest management structure of all such resources. It also has the longest and richest history, one characterized by major changes to the underlying law that established the more comprehensive administrative regime, as well as intense political conflict resulting from divisions among stakeholders and tensions inherent in American federalism. The development of other ocean energy resources—some of which are newly emerging technologies—have differing levels of management, but none are currently making any noteworthy contributions to domestic production numbers. Historically, there also have been varying expressions of commercial interest in non-energy minerals in the U.S. exclusive economic zone (EEZ), but only sand and gravel have been used in recent years by coastal states and communities, because of a change which eased access to those resources.

## MANAGING OFFSHORE OIL AND GAS RESOURCES

As noted in Chapter 2, from its beginning the federal offshore oil and gas program faced controversy over ownership issues, as states unsuccessfully sued the federal government over control of offshore waters. Once that issue was settled legislatively, there was a short but relatively stress-free period. Conflict, however, soon emerged over issues of management, environmental risks, and the costs and benefits of energy exploration and production on the OCS that continues to this day. Proponents point to the program's contributions to the nation's energy supplies and economy, significant improvements in its safety and environmental record, and noteworthy technological achievements. Opponents argue that offshore oil activities harm coastal communities economically and the marine environment unacceptably. The ongoing debate is carried out in the halls of Congress, federal agencies, state and local governments, trade associations, and nongovernmental

organizations. OCS oil and gas development is a classic example of the politics of multiple use resource management, including federal-state tensions, competing user issues, arguments over the interpretation of data, and disagreements concerning tolerable levels of risk.

Despite its political problems, which are best understood through an awareness of the historical context associated with it, today the OCS oil and gas program has a well institutionalized and reasonably comprehensive management regime. While not without its critics, the program seeks to balance the many competing interests involved in offshore energy activity, requires state and local government input in federal decisions, and specifies detailed procedures to be followed by those seeking offshore leases. It also manages the various processes associated with access to non-energy minerals on the OCS.

Energy development in federal waters is big business and has become an important part of the fabric of the U.S. ocean policy mix. Most observers agree that the federal OCS oil and gas program benefits America by helping to meet energy needs, creating thousands of jobs, and contributing billions of dollars to the U.S. Treasury. Despite the limited offshore geographic area from which production flows and in which leasing is authorized, the amount of oil and gas production from the OCS is significant. In 2002 and 2003, federal offshore waters produced more than 600 million barrels of oil annually[1] and about 4.5 trillion cubic feet of natural gas.[2]

## From a Quiet Beginning to Prohibitions on Leasing

In 1953, Congress enacted the Submerged Lands Act, which codified coastal states' jurisdiction off their shores out to three nautical miles (or, for historic reasons, nine nautical miles for Texas and the Gulf coast of Florida). That same year, regulation of OCS oil and gas activity seaward of state submerged lands was vested in the Secretary of the Interior with the passage of the Outer Continental Shelf Lands Act (OCSLA), which established federal jurisdiction over the OCS for the purpose of mineral leasing. For a period of some fifteen years, the offshore energy program was relatively quiet, being confined largely to leasing off of Louisiana and Texas. In the late sixties, however, the relative peace on the OCS would be dramatically changed.

As discussed in Chapter 2, the 1969 Santa Barbara blowout took place during an era of rapidly expanding environmental awareness and helped spur the enactment of numerous major environmental laws, including the National Environmental Policy Act (NEPA), the Coastal Zone Management Act (CZMA), the Marine Mammal Protection Act (MMPA), and the Marine Protection, Research, and Sanctuaries Act (MPRSA).

Just as the nation's environmental consciousness rose, so too did recognition of the need for secure supplies of oil and gas. Also, as noted in Chapter 2, the 1973 Arab oil embargo prompted President Nixon to announce plans to lease ten million OCS acres in 1975, an area equal to the entire amount leased prior to that time. Sales were scheduled not only in areas of earlier OCS activity, but also along the Atlantic and Pacific coasts. The result was a nationwide debate that raged through the remainder of the decade, pitting the oil and gas industry and its allies against various representatives of coastal states, commercial and sport fishing interests, and environmental organizations.

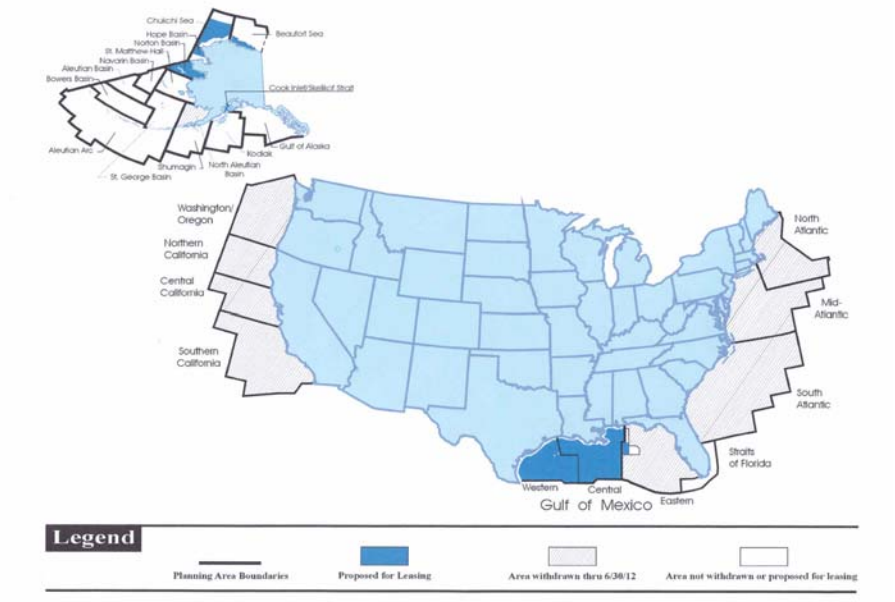
Congress responded to this debate by virtually rewriting the OCSLA in 1978, requiring the Secretary of the Interior to balance the nation's needs for energy with the protection of human, marine, and coastal environments, make certain that the concerns of coastal states and competing users were taken into account, and ensure that some of the newly enacted environmental laws were integrated into the OCS process. However, before regulations and procedures could be fully developed to support the amended law, in the early 1980s the Reagan administration proposed to terminate funding for the Coastal Zone Management Act (CZMA) and its Coastal Energy Impact Program(CEIP). The CEIP was specifically designed during the debate over the OCSLA amendments to provide grants and loans to coastal states to deal with the environmental effects occasioned by OCS activities. At the same time these budget cuts were put forward, the Secretary of the Interior was pursuing an aggressive offshore program that would make one billion acres

available for oil and gas leasing over the ensuing five years. Thus began the modern day version of the battle over offshore oil, one that has endured for over two decades and has included major legislative and executive branch negotiations, actions to restrict leasing in so-called "frontier" areas, Supreme Court cases, federal-state battles over administrative procedures and the sharing of revenues, and the buyback of some OCS leases by the federal government.

In its initial reaction to the proposed budget cuts, Congress was able to save the CZMA, but not the CEIP. It then turned its attention to restricting and ultimately prohibiting a substantial part of the OCS leasing schedule of the U.S. Department of the Interior (DOI). Using its appropriations process in 1982, Congress put four basins offshore northern California off limits to leasing. For the next few years, every annual DOI funding bill included leasing prohibitions on additional regions until practically all offshore planning areas outside of the Gulf of Mexico and Alaska were excluded.

Additionally, Presidents have expanded on congressional action, providing longer term restrictions than those covered in annual appropriations bills. In 1990, President Bush withdrew areas offshore California, southern Florida, the North Atlantic states, Washington, and Oregon from leasing consideration until after 2000. A few years later, the Clinton Administration added additional areas to the restricted list, extended all of the withdrawals until 2012, and included a permanent prohibition on leasing in national marine sanctuaries. These presidential and congressional actions have removed some 610 million acres from leasing consideration and effectively limited access to the OCS program to the central and western Gulf of Mexico (95 percent of offshore production), a small portion of the eastern Gulf, and virtually all areas off Alaska (Figure 24.1).

**Figure 24.1. Offshore Oil and Gas Leasing has been Limited to a Few Planning Areas**




Shown above are the outer Continental Shelf planning areas in the Minerals Management Service's 2002-2007 leasing program. The entire West Coast and almost all of the East Coast have been restricted from leasing through 2012, leaving only areas of the central and western Gulf of Mexico (and a small area of the eastern Gulf) and virtually all areas off the Alaskan coast available for development.
Figure Courtesy of Minerals Management Service, Department of the Interior, Washington, DC.

## The OCS Leasing, Exploration, and Development Process

As already noted, the OCSLA is a relatively comprehensive resource management statute. Besides authorizing the Secretary of the Interior to hold competitive lease sales for offshore tracts, regulate and oversee lease activities, and encourage efficient, safe, and diligent production, the law specifies the steps potential lessees

must take to bid on offshore tracts and the process that occurs after receiving a lease. For example, the OCSLA requires consultation with coastal states and localities at a number of points in the federal offshore decision-making process, including during the development of a five-year leasing program, individual lease sale delineations, exploration and development-production plans, and environmental studies and oil and gas information programs. Further, the law carries provisions on offshore safety regulations, citizen suits and judicial review, enforcement authority, the applicability of NEPA, geological and geophysical exploration, export limitations, documentation requirements for offshore vessels and rigs, and numerous opportunities to address other environmental issues.

DOI's Minerals Management Service (MMS) characterizes its administration of the OCSLA as being "process rich" (Figure 24.2). Through the initial years of promulgating regulations to implement the 1978 amendments, and through litigation about the meaning of certain provisions, the current OCS leasing and development program is one that is, on balance, coherent and reasonably predictable. Although the comprehensiveness of the program has not precluded the political battles noted above nor avoided restrictions on leasing in frontier areas, in those areas of the nation where offshore development is accepted, the internal administrative process is well known and understood by those who invest in offshore leases and those who choose to observe and comment on such activity. The OCSLA is replete with references to the applicability of other statutes and the authority of other departments in the oil and gas process, and presents a clearer roadmap than most other offshore resource management laws or programs.

After an initial bumpy start in the implementation of major amendments to its basic law, the problems encountered by the offshore oil and gas program today are generally external to its day-to-day administration and regulatory requirements. Although a number of different variables have to be taken into consideration in crafting a regime for other ocean uses, the scope and comprehensiveness of the OCS oil and gas program can be a model for the management of a wide variety of offshore activities.

## Trends in Domestic Offshore Oil and Gas Production

Currently, energy development in federal waters accounts for more than 30 percent of domestic oil production and 25 percent of natural gas. Further, the offshore areas of the United States contain an estimated 60 percent of the oil and natural gas yet to be discovered domestically.[3]

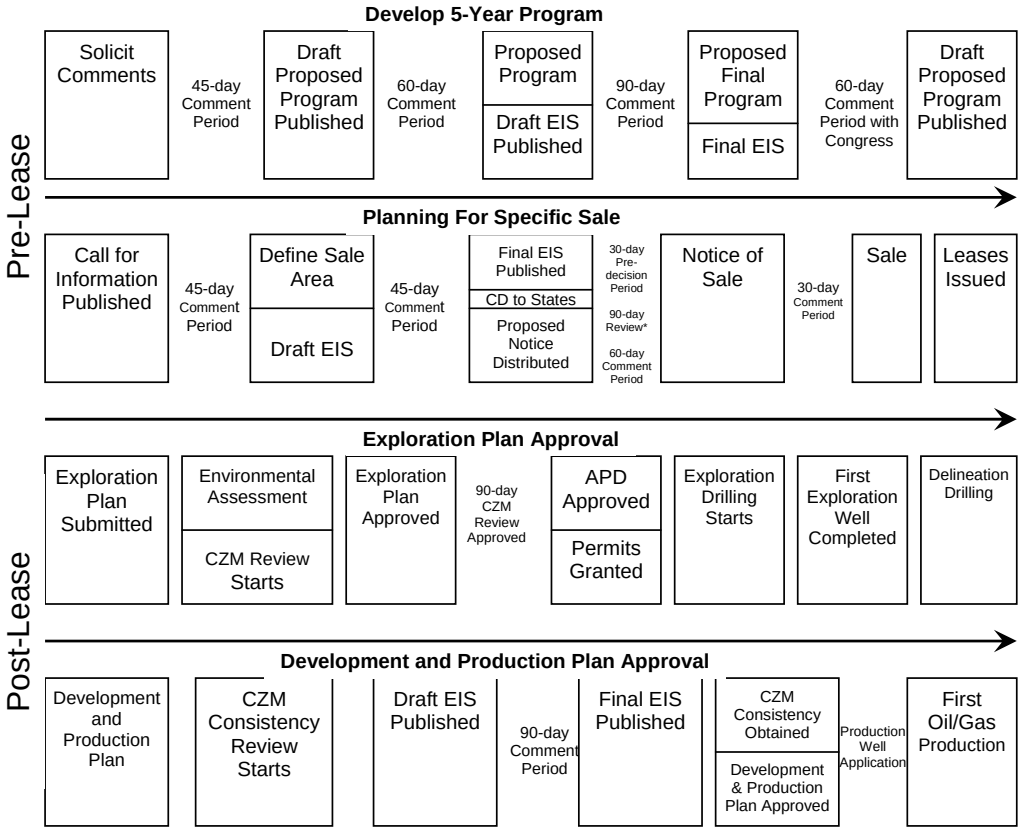
Virtually all (more than 95 percent) of U.S. offshore oil and gas production takes place in the western and central Gulf of Mexico, where there is an established infrastructure and general public acceptability. There is still some offshore production in Southern California and limited leasing and exploration in federal waters off Alaska. The first oil production from a joint federal-state lease in the Beaufort Sea (Alaska) commenced in 2001.

The importance of offshore oil and natural gas to the nation's total energy portfolio is expected to increase. The U.S. Energy Information Administration projects the United States will need about 35–40 percent more natural gas and about 45 percent more oil by 2025 to meet demand, even as new energy conservation measures are mandated and efforts to develop alternative power sources continue.[4] Government and industry experts are concerned that rising demand for and limited supplies of natural gas will continue to boost heating and electricity costs, affecting homeowners and a range of major industries. Nearly all U.S. electric-generating plants built since 1998 are fueled by natural gas.

### *Rise in Deep-water Oil Production*

Although production in the Gulf's heavily leased shallow waters has been steadily declining, production in the Gulf's deeper waters (more than 1,000 feet), which tend to produce more oil than natural gas, increased by 276 percent between 1996 and 2000.[5] In part, this growth was attributable to technological breakthroughs, the

**Figure 24.2. A "Process Rich" but Clear Path to Offshore Leasing, Exploration, and Development Activities**




Abbreviations:
- APD: Application for Permit to Drill
- CD: Consistency Determination
- CZM: Coastal Zone Management
- EIS: Environmental Impact Statement

* Includes 60-day Comment Period and 15-day automatic extension. Unless State concurs, no decision can be made until 90 days after beginning of State review.

The process by which companies and other stakeholders comment on proposed sales and lease, explore, and develop the outer Continental Shelf is clearly defined in the Outer Continental Shelf Lands Act. Although there are many steps involved, its comprehensiveness and transparency not only set out clear comment periods for coastal states and other interested stakeholders, but also provide companies greater predictability about the procedures they must follow to receive approval for their exploration and production work.

Figure Courtesy of Minerals Management Service, Department of the Interior, Washington, DC

relative stabilization of crude oil prices, and the enactment of legislation in 1995 granting various levels of royalty relief to lessees willing to make the risky investment in the Gulf's deeper waters. Deep-water oil production now accounts for more than half of the Gulf's total production.[6] Additionally, the technology for ultra–deep-water development continues to advance with the drilling of a number of exploratory and production wells in water depths greater than 7,000 feet. Recently, a world record exploratory well was drilled in 10,000 feet of water.

### *A Promising Future for Natural Gas from Shallow Water*

MMS estimates there is up to 55 trillion cubic feet (tcf) of natural gas available for production in the deep shelf areas of the Gulf (15,000 feet below the seabed but in shallow-water depths of less than 656 feet). This estimate is 175 percent greater than the previous projection of 20 tcf just a few years ago. This is a hopeful sign of additional sources of natural gas to meet a portion of the nation's future needs. Natural gas production from this deep shelf area of the Gulf increased from a relatively low 284 billion cubic feet (bcf) in

2000 to 421 bcf in 2002. This 2-year, 50 percent increase follows immediately after a 3-year, 21 percent decrease between 1997 and 2000.[7] To bolster industry interest in this high-cost deep drilling area, in 2001, MMS instituted a program of deep shelf royalty relief for natural gas production. This economic incentive, combined with more sophisticated cost-effective technology, improved seismic data, better understanding of the potential from the deep shelf, and increased public demand, is likely to provide the impetus for even further accelerated natural gas production from the OCS.

## Federal Revenues from Offshore Oil and Gas Leasing and Production

The federal government receives substantial sums of revenue from energy companies for offshore oil and gas leasing and production. OCS lessees make three categories of payments: bonus bids when a lease is issued, rental payments before a lease produces, and royalties on any production from the lease. In the half century of the oil and gas program's existence, between 1953 and 2002, it has contributed approximately $145 billion in federal revenues.[8] In recent years, the revenues generated from offshore energy activity have averaged $4–$5 billion annually (Table 24.3). Although most of the revenues have been deposited directly into the U.S. Treasury, a significant portion has gone to the Land and Water Conservation Fund and the National Historic Preservation Fund.

**Table 24.3. Federal Revenues from Offshore Mineral Development**
Significant funds are paid into the U.S. Treasury each year from outer Continental Shelf (OCS) bonuses, royalties, and rents. This money is used in part to help support federal conservation and preservation programs and a small amount generated from near shore development is shared with some OCS producing states.

| Year | Oil and Gas Royalties | Bonuses, Rents and Other Revenue | Total by Year |
|---|---|---|---|
| **1997** | $3,444,561,989 | $1,814,666,046 | $5,259,228,035 |
| **1998** | $2,703,722,873 | $1,618,914,459 | $4,322,637,332 |
| **1999** | $2,611,742,229 | $576,646,226 | $3,188,388,455 |
| **2000** | $4,094,576,078 | $1,115,086,564 | $5,209,662,642 |
| **2001** | $5,448,825,260 | $1,056,762,550 | $6,505,590,810 |
| **Total** | **$18,303,428,429** | **$6,182,075,845** | **$24,485,504,274** |

Source: Minerals Management Service, Department of Interior. <http://www.mrm.mms.gov/Stats/pdfdocs/coll_off.pdf> (Accessed March, 2004). Year 2001 data courtesy of MMS Revenue Management Office, Lakewood, CO.

### *A Question of Equity: Sharing OCS Receipts with Coastal States*

Mineral resources on federal land, whether onshore or offshore, benefit the nation as a whole. The primary law governing onshore mineral development is the Mineral Leasing Act (MLA), and the comparable law for offshore minerals is the OCSLA. These two statutes are analogous in many ways except for one – the sharing of revenues with states. Under the MLA, each of the lower 48 states directly receives 50 percent of all mineral leasing revenues from public lands within its boundaries and an additional 40 percent through the Reclamation Fund; the state of Alaska receives 90 percent directly. Also, there is a broad array of additional federal land onshore receipts sharing programs, including the National Forest Receipts Program, the Taylor Grazing Act, and others. Eligible uses of the shared receipts vary widely. Some programs require that the funds be used by the recipient jurisdiction for specific purposes such as schools, roads, or land and resource improvements, while others allow the states more discretion.

Furthermore, once leased under the MLA or some other land management statutes, federal onshore lands are generally subject to most state and local taxes; the most noteworthy in many cases is the ability of states to levy severance taxes from minerals developed on federal lands within their borders. Additionally, if local governments lose property tax revenue because of the existence of federal lands, there are a variety of federal agency programs that provide localities with payments in lieu of taxes.

In contrast, the OCSLA specifically prohibits the applicability of state taxes to the OCS. Moreover, there is no comparable general offshore revenue sharing program like the MLA for coastal states. Proponents of such an initiative argue that although the energy development occurs in federal waters outside of coastal state boundaries, many of the impacts resulting from such activity occur locally, in and near the states' coastal zones. They contend that affected states and communities should receive assistance in coping with the costs of facilitating offshore development, including actions to minimize the risk of environmental damage. Officials in the executive branch have traditionally opposed revenue sharing, largely because of the potential loss to the federal treasury.

For decades, Congress has debated proposals to enact a general OCS revenue sharing statute—including the Coastal Energy Impact Program in the mid-1970s—to help states address the effects of offshore production and remedy the apparent inconsistency with onshore mineral development. Disputes over the fair division of revenues from resources discovered in fields that straddle state and federal submerged lands were resolved in 1986. In that year, Congress amended the OCSLA to require that 27 percent of revenues from federal leasing and production activity within three nautical miles seaward of the federal–state offshore boundary be given to the affected state. Through the release of money that was being held in escrow, the awarding of past payments owed to the states, and subsequent entitlement to 27 percent of current and future royalties from the three-mile area, the seven OCS "producing" states have received slightly more than $3 billion since 1986. Currently, this program provides only some $50-60 million annually to such states. In fiscal year 2001, Congress authorized and appropriated $142 million for a Coastal Impact Assistance Program to be allocated among the producing states by the National Oceanic and Atmospheric Administration (NOAA). However, this was a one-year authorization, and no further funding has been provided.

### *Enhancing the Federal-State Ocean and Coastal Partnership*

In various parts of this report, recommendations are made not only to strengthen the coordination of ocean policy and agency organization at the federal level, but also the involvement of non-federal governmental and nongovernmental stakeholders through a formal mechanism of a presidential council of advisors, regional ocean councils, and other less formal structures. In effect, the time has come for a new ocean and coastal partnership between the federal government and state, local, and tribal governments. This partnership should include a recognition that much of the responsibility for the management of the nation's ocean and coastal resources rests with coastal state and local governments. In fact, that recognition is the foundation of the CZMA, permeates many other natural resource management programs, and is specifically acknowledged in Chapter 30.

As the federal-state ocean and coastal partnership began to evolve, the nation determined that the activities associated with development of nonrenewable resources should not be pursued at the expense of the long-term health of renewable resources. That is why the OCSLA, the CZMA, and other applicable federal statutes call for the balanced management of offshore oil and gas, the protection of the ocean and coastal environment, and the involvement of state and local governments. The day will come when oil and gas will no longer be found or developed in the nation's submerged lands, but if the proper policies are pursued, the renewable resources of the estuaries, coasts, oceans, and Great Lakes, and the economic activities that depend upon them, will remain healthy and strong.

To make certain that the federal-state partnership is strengthened and that critical marine ecosystems are protected, more investment of the resource rents generated from OCS energy leasing and production into the sustainability of ocean and coastal resources is necessary. Specifically, some portion of the revenues received by the federal government annually for the leasing and extraction of *nonrenewable* offshore resources need to be allocated to all coastal states for programs and efforts to enhance the conservation and sustainable development of *renewable* ocean and coastal resources. A larger portion of the allocation will need to be granted to the OCS-producing states to help them address the environmental and socioeconomic impacts

from offshore oil and gas-related activity. None of the programs that currently receive revenues from OCS oil and gas activity should be adversely affected by this allocation.

**Recommendation 24–1. Congress, with input from the National Ocean Council, should ensure that a portion of the revenues that the federal government receives from the leasing and extraction of outer Continental Shelf (OCS) oil and gas is invested in the conservation and sustainable development of renewable ocean and coastal resources through grants to all coastal states. States off whose coasts OCS oil and gas is produced should receive a larger share of such portion to compensate them for the costs of addressing the environmental and socioeconomic impacts of energy activity in adjacent federal waters.**

### State Involvement in OCS Oil and Gas Decision-making

The partnership between the federal and state governments with respect to activities in federal waters should involve more than the sharing of some revenues. The central role of states in the new ocean policy framework is addressed in practically every chapter of this report. For example, Chapter 6 specifically calls for a more robust federal-regional-state dialogue in the building of coordinated offshore management regime. Chapter 9 addresses the link between coastal and offshore management, including the role of the federal consistency provision of the CZMA, despite some disagreements between levels of government, in enhancing cooperative federalism.

With respect to offshore oil and gas, the 1978 amendments to the OCSLA were intended, among many purposes, to bring state and local governments into much clearer and statutorily specified consultative roles at various points in DOI's decision-making process. Further, the amendments made clear that the federal consistency provision of the CZMA applied to exploration, development, and production plans submitted to the Secretary of the Interior under the OCSLA. (For further information, see the box on "The Federal Consistency Provision and Offshore Oil and Gas Development.")

### Environmental Issues Related to Offshore Oil and Gas Production

As with most industrial development activities, along with the economic and energy-related benefits of OCS oil and gas production are actual and perceived risks to the environment, coastal communities, and competing users. Since the 1969 Santa Barbara blowout, the U.S. oil industry's environmental and safety record has improved significantly, as has the regulatory regime of DOI. Today, safety stipulations are more stringent, technologies are vastly improved, inspections are regular and frequent, and oil spill response capabilities are in place. Nevertheless, there remain numerous environmental issues associated with the development and production of oil and gas from the OCS. Foremost among these are:

- physical damage to coastal wetlands and other fragile areas by OCS-related onshore infrastructure and pipelines.
- physical disruption of and damage to bottom-dwelling marine communities.
- discharge of contaminants and toxic pollutants present in drilling muds and cuttings and in produced waters.
- emissions of pollutants from fixed facilities, vessels, and helicopters.
- seismic exploration and production noise impacts on marine mammals and fish and other wildlife.
- immediate and long-term ecological effects of large oil spills.
- chronic, low-level impacts on natural and human environments.
- cumulative impacts on the marine, coastal, and human environments.

The most obvious of these risks and the one most commonly cited, is the potential for oil spills including drill rig blowouts, pipeline spills, and chronic releases from production platforms. The impacts of large oil spills can last from years to decades, particularly in critical habitats, such as wetlands and coral reefs.

**The Federal Consistency Provision and Offshore Oil and Gas Development**

The application of the federal consistency provision of the CZMA to offshore energy development has been among the most contentious issues among the federal government, coastal state governments, and OCS lessees. In the mid 1970's, Congress amended the original version of the federal consistency provision to add a section that explicitly covered certain OCS activities. Of the thousands of exploration and development plans submitted by oil and gas companies over the years and approved by MMS, states have concurred with the consistency of such plans with their state coastal management program in virtually all of the cases. But there have been a handful in which states have objected and these are generally cases of high visibility, of which fifteen have been appealed to the Secretary of Commerce. These appeals resulted in fourteen decisions by the Secretary, half of which overrode the state's objection and half did not.

In a case that reached the highest court in the land in 1984, the U.S. Supreme Court held that OCS lease sales were not subject to the consistency provision of the CZMA. In 1990, Congress enacted a law which reversed the decision, clarified that such sales are subject to a state consistency review, and made a number of other changes to the interpretation of the federal consistency provision that resulted in a lengthy rule-making process by NOAA. The final rule was published in 2000.

In 2001, the Vice President submitted the National Energy Policy report of the National Energy Policy Development Group to the President.[9] The report contained a section on the OCSLA, as administered by MMS, and the CZMA, as carried out by NOAA. It noted that the effectiveness of these programs is "sometimes lost through a lack of clearly defined requirements and information needs from federal and state entities, as well as uncertain deadlines during the process." The report recommended that the Secretaries of Commerce and the Interior reexamine the legal and policy regimes to see if changes were needed regarding energy activities in the coastal zone and the OCS.

In 2003, after a series of negotiations between the two departments, the Department of Commerce published a proposed rule addressing the information needs of states, coordination of timing requirements between the OCSLA and the CZMA, definitive time limits on the Secretary of Commerce's appeals process, and additional procedural matters. (For a more detailed discussion of the OCS-specific federal consistency provisions of the CZMA and the issues related to their implementation, including a history of related litigation, see Appendix 6.)

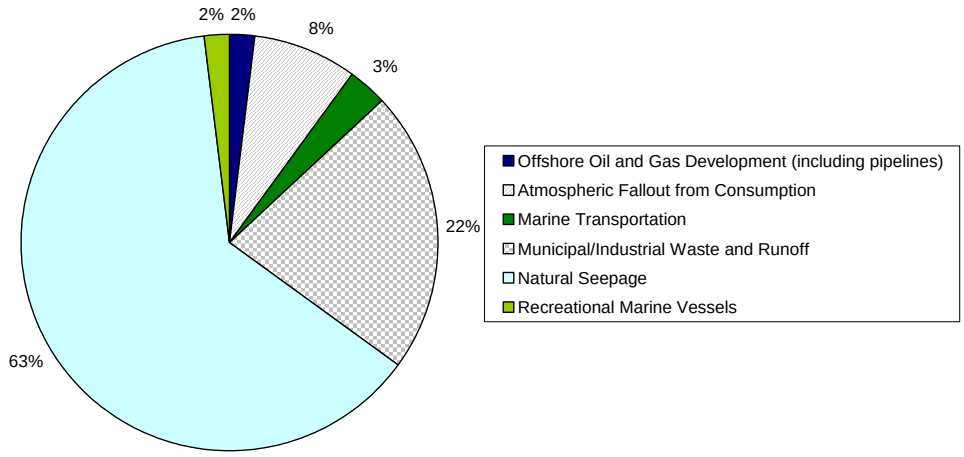
According to MMS, 97 percent of OCS spills are one barrel or less in volume and U.S. OCS offshore facilities and pipelines accounted for only 2 percent of the volume of oil released into U.S. waters for the period 1985-2001 (Figure 24.4).[10] The total volume and number of such spills over that period have been significantly declining due to industry safety practices and improved spill prevention technology. By comparison, the National Research Council estimated that 690,000 barrels of oil enter North American ocean waters each year from land-based human activities, and another 1,118,000 barrels result from natural seeps emanating from the seafloor.[11]

However, spills from aging pipelines are a continuing concern. Since 1981, the volume of oil spilled from OCS pipelines is four to five times greater than that from OCS platforms (Figure 24.5).[12] Long-term exposure to weather and marine conditions make pipelines older than 25 years considerably more susceptible to spills and leaks as a result of stress fractures and material fatigue. Also, these older pipelines do not incorporate the advanced oil spill detection and prevention technology that has been developed in more recent years.

MMS's Environmental Studies Program (ESP) is a major source of information about the impacts of OCS oil and gas activities on the human, marine, and coastal environments. Since 1986, annual funding for the program has decreased, in real dollars, from a high of $56 million to approximately $18 million in 2003. Even accounting for the contraction in the areas available for leasing, the erosion in ESP funding has occurred at a time when more and better information, not less, is needed. There continues to be a need to better

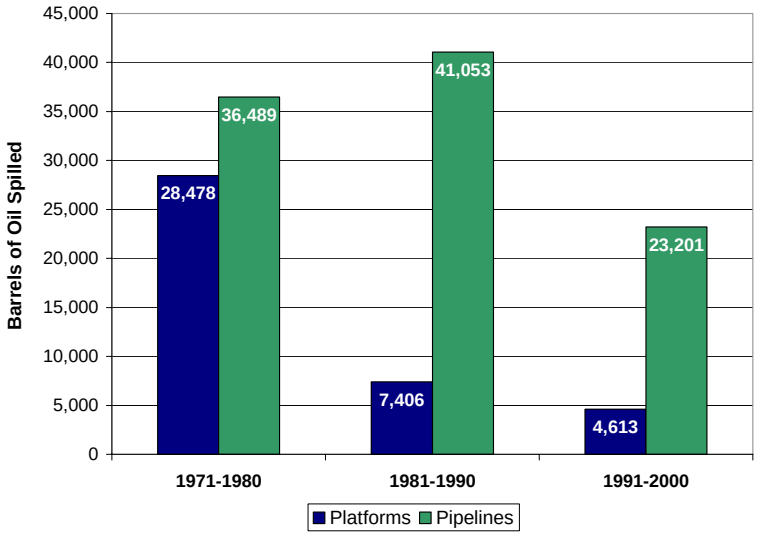
understand the cumulative and long-term impacts of OCS oil and gas development, especially in the area of low levels of persistent organic and inorganic chemicals, and their cumulative or synergistic effects.

**Figure 24.4. Sources of Oil in the North American Marine Environment**




Offshore oil and gas development contributes only 2 percent of the 1.8 million of barrels of oil released into North American waters each year. Natural seepage from the sea floor is by far the largest input, while runoff and waste from human land-based activities contribute roughly a quarter of the oil present in the marine environment. When calculated worldwide, the oil released from offshore oil and gas development still only accounts for 4 percent of the total 8.9 million barrels. (One barrel is equal to 42 gallons.)
Source: Minerals Management Service. *OCS Oil Spill Facts*, 2002. <http://www.mms.gov/stats/PDFs/2002_OilSpillFacts.pdf> (Accessed March, 2004).

**Figure 24.5. Aging Pipelines are a Leading Source of Oil Leaks from OCS Infrastructure**




In the last thirty years, the amount of oil spilled from OCS platforms and pipelines has continued to decrease. However, the increasing disparity between the number of barrels spilled from platforms versus pipelines indicates that the pipeline infrastructure—which is more exposed to the effects of weather and saltwater—needs updating to prevent future spills.
Source: Minerals Management Service. *OCS Oil Spill Facts*, 2002. <http://www.mms.gov/stats/PDFs/2002_OilSpillFacts.pdf> (Accessed March, 2004).

Also, as noted, OCS oil and gas exploratory activities in the Gulf of Mexico are now occurring in water depths approaching 10,000 feet with projections that the industry will achieve 15,000 feet drilling capabilities within the next decade. The technological ability to conduct oil and gas activities in ever deeper waters on the OCS places a significant and important responsibility on MMS to collect the essential environmental deep-

water data necessary for it and other agencies to make informed management and policy decisions on exploration and production activities at those depths. Thus, as our knowledge base increases and the industry expands its activities further offshore and into deeper waters, new environmental issues are emerging that cannot all be adequately addressed under the current ESP budget.

**Recommendation 24–2. The U.S. Department of the Interior should reverse recent budgetary trends and increase funding for the Minerals Management Service's Environmental Studies Program.**

*Increased funding should be used for:*

- *conducting long-term environmental monitoring at appropriate outer Continental Shelf (OCS) sites to better understand cumulative, low-level, and chronic impacts of OCS oil and gas activities on the natural and human environments.*
- *working with state environmental agencies and industry to evaluate the risks to the marine environment posed by the aging offshore and onshore pipelines in the Gulf of Mexico.*

### Opportunities for Sharing Ocean Observation Information and Resources

Floating drilling rigs and production platforms are able to maintain position over the tops of wells thousands of feet below without the need for mooring or permanent structures. Dynamic positioning systems compensate for wind, waves, or currents to keep the vessel stationary relative to the seabed, and new hull designs maintain stability. Three- and four-dimensional subsurface images allow operators to obtain a better idea of how a reservoir behaves and increase the likelihood of drilling success. And the use of horizontal and directional drilling creates more flexibility in deciding where to site offshore platforms.

The movement of oil and natural gas exploration, development, and production activities further offshore into deeper waters and into more harsh marine environments, such as the Arctic, affords an excellent opportunity for incorporating the industry's offshore infrastructure into the national Integrated Ocean Observing System (IOOS), as discussed in Chapter 26. In addition to its offshore infrastructure, the industry has great technological capacity for collecting, assimilating, and analyzing environmental data of direct importance to the IOOS. The U.S. offshore industry has a history of partnering with ocean scientists by allowing them to use production platforms for mounting environmental sensors, and in some cases, collecting and providing them with environmental data and information. The industry would benefit from partnering in the IOOS as a user of the system's data and information products and by being involved in its design, implementation, and future enhancement.

**Recommendation 24–3. The National Oceanic and Atmospheric Administration, working with the Minerals Management Service and the offshore oil and gas industry, should establish a partnership that will allow the use of industry resources, including pipelines, platforms, vessels, and research and monitoring programs, as part of the Integrated Ocean Observing System (IOOS).**

*Specifically, this partnership should:*

- *facilitate the transfer of nonproprietary data to research and academic institutions while protecting the security of proprietary data and meeting other safety, environmental, and economic concerns.*
- *include the offshore oil and gas industry as an integral partner in the design, implementation, and operation of the IOOS, notably in the regional observing systems in areas where offshore oil and gas activities occur.*

## ASSESSING THE POTENTIAL OF OFFSHORE METHANE HYDRATES

Conventional oil and gas are not the only fossil-based fuel sources located beneath ocean floors. Methane hydrates are solid, ice-like structures composed of water and natural gas. They occur naturally in areas of the world where methane and water can combine at appropriate conditions of temperature and pressure, such as in thick sediments of deep ocean basins, at water depths greater than 500 meters.

The estimated amount of natural gas in the gas hydrate accumulations of the world greatly exceeds the volume of all known conventional gas resources.[13] A 1995 U.S. Geological Survey (USGS) estimate of both marine and Arctic hydrate resources revealed the immense energy potential of hydrates in the United States.[14] These deposits have been identified in Alaska, the east and west coasts of the United States, and in the Gulf of Mexico. USGS estimated that the methane hydrates in U.S. waters hold a mean value of 320,000 trillion cubic feet of natural gas, although subsequent refinements of the data have suggested that the estimate is a slightly more conservative 200,000 trillion cubic feet.[15] Even this more conservative estimate is enough to supply all of the nation's energy needs for more than 2,000 years at current rates of use.[16]

However, there is still no known practical and safe way to develop the gas and it is clear that much more information is needed to determine whether significant technical obstacles can be overcome to enable methane hydrates to become a commercially viable and environmentally acceptable source of energy.

In the United States, federal research concerning methane hydrates has been underway since 1982, was intensified in 1997-98, and received further emphasis with the passage of the Methane Hydrate Research and Development Act in 2000. That Act established an interagency coordination mechanism that includes the Departments of Energy, Commerce, Defense, and the Interior, and the National Science Foundation, and directed the National Research Council (NRC) to conduct a study on the status of research and development work on methane hydrates. The NRC study is scheduled for release in September 2004.

**Recommendation 24–4. The National Ocean Council (NOC), working with the U.S. Department of Energy and other appropriate entities, should review the status of methane hydrates research and development and seek to determine whether methane hydrates can contribute significantly to meeting the nation's long-term energy needs. If such contribution looks promising, the NOC should determine how much the current investment in methane hydrates research and development efforts should be increased, and whether a comprehensive management regime for private industry access to methane hydrates deposits is needed.**

## DEVELOPING OFFSHORE RENEWABLE ENERGY RESOURCES

Environmental, economic, and security concerns have heightened interest among many policy makers and the public in renewable sources of energy. Although offshore areas currently contribute little to the nation's supply of renewable energy, the potential is significant and could include offshore wind turbines, mechanical devices driven by waves, tides, or currents, and ocean thermal energy conversion, which uses the temperature difference between warm surface and cold deep ocean waters to generate electricity.

### Offshore Wind Energy Development

While the offshore wind power industry is still in its infancy in the United States, it is being stimulated by improved technology and federal tax credits that have made it more attractive commercially. Additionally, developers are looking increasingly to the lead of European countries such as Denmark, the United Kingdom, and Germany, where growing numbers of offshore projects are being licensed.

In fact, the United States already has a wind energy management program applicable on some federal lands onshore. This comprehensive program carried out by DOI's Bureau of Land Management, under broad authority provided by the Federal Land Policy and Management Act.

Conversely, there is no comprehensive and coordinated federal regime in place to regulate offshore wind energy development or to convey property rights to use the public space of the OCS for this purpose. In the absence of a specific regime, the U.S. Army Corps of Engineers (USACE) is the lead federal agency responsible for reviewing and granting a permit for this activity. Its authority, however, is based on Section 10

of the Rivers and Harbors Act, which, although it has a public interest requirement, primarily regulates obstructions to navigation, including approval of any device attached to the seafloor.

In reviewing a proposed project under Section 10, the USACE is required by the National Environmental Policy Act to consult other federal agencies. Depending on the circumstances, these agencies and authorities may include:

- The U.S. Coast Guard, which regulates navigation under several federal statutes.
- The Federal Aviation Administration, which regulates objects that may affect navigable airspace pursuant to the Federal Aviation Act.
- The U.S. Environmental Protection Agency, which may conduct a review for potential environmental impacts of a project pursuant to the Clean Water Act and Clean Air Act.
- The National Marine Fisheries Service, which may review projects for potential impacts to fishery resources pursuant to the Magnuson-Stevens Fishery Conservation and Management Act. In addition, NMFS review includes assessing potential impacts to endangered or threatened species under the Endangered Species Act or the Marine Mammal Protection Act.
- The U.S. Fish and Wildlife Service, which may review projects for potential impacts to endangered species or marine mammals under its jurisdiction pursuant to the Endangered Species Act or the Marine Mammal Protection Act.
- In addition, depending on its location, a wind energy project or at least the Section 10 permit may be subject to review by one or more state coastal management programs in accordance with the CZMA federal consistency provisions.

The Section 10 review process stands in stark contrast both to the well established DOI regulatory program for onshore wind energy and, in the marine setting, to the robust regulatory program for offshore oil and gas that has developed under the OCSLA. Using the Section 10 process as the primary regulatory vehicle for offshore wind energy development is inadequate for a number of reasons. First and foremost, it cannot grant leases or exclusive rights to use and occupy space on the OCS. It is not based on a comprehensive and coordinated planning process for determining when, where, and how this activity should take place. It also lacks the ability to assess a reasonable resource rent for the public space occupied or a fee or royalty for the energy generated. In other words, it lacks the management comprehensiveness that is needed to take into account a broad range of issues, including other ocean uses in the proposed area and the consideration of a coherent policy and process to guide offshore energy development.

**A Mighty Wind Blows in Cape Cod**

The first proposal for offshore wind energy development in the United States is testing the ability of the federal system to manage this emerging industry. The proposal calls for use of approximately 23 square miles of Nantucket Sound, some 5.5 nautical miles off the coast of Cape Cod, Massachusetts. It would consist of 170 wind turbines, each of which would be sunk into the ocean floor and reach up to 420 feet above the ocean surface. The project would generate an annual average of approximately 160 megawatts of electrical power.[17]

This project has divided local citizens, elected officials, environmentalists, business interests, and other stakeholders. Supporters cite the project's potential to reduce pollution, global warming, and reliance on foreign oil, while opponents warn of bird deaths, harm to tourism, interference with commercial and sports fishing, and obstructed views.

Despite the controversy, the project is proceeding through the Section 10 review process. In the meantime, proposals for offshore wind development projects up and down the East Coast are proliferating.

## Wave Energy Conversion—Current and Tidal

Various technologies have been proposed to use wave or tidal energy, usually to produce electricity. The wave energy technologies for offshore use include floating or pitching devices placed on the surface of the water that convert the horizontal or vertical movement of the wave into mechanical energy that is used to drive a turbine. Currently, the offshore wave, tidal, and current energy industry is in its infancy. Only a small proportion of the technologies have been tested and evaluated.[18] Nonetheless, some projects are moving forward in the United States, including one to install electricity-producing wave-energy buoys more than three nautical miles offshore Washington State, in the Olympic Coast National Marine Sanctuary. Internationally, there is considerable interest in wave, tidal, and current energy, but the projects are almost all in the research and development stage.

The Federal Energy Regulatory Commission (FERC) asserts jurisdiction, under the Federal Power Act (FPA), over private, municipal, and state (not federal) hydropower projects seaward to 12 nautical miles. FERC has formally asserted jurisdiction over the Washington State project, and is likely to assert jurisdiction over all forms of wave or tidal or current energy projects whose output is electricity, from the shoreline out to 12 nautical miles offshore, on the basis that they are "hydropower" projects under the FPA.

Although in issuing a license for a wave, current, or tidal project FERC is directed by the FPA to equally consider environmental and energy concerns, it is not an agency with a broad ocean management mission. As with wind energy, several other federal laws may apply to ocean wave projects. For example, NEPA, the federal consistency provision of the CZMA, the National Historic Preservation Act, and the Fish and Wildlife Coordination Act may apply, as may the consultation provisions of the Endangered Species Act and the Marine Mammal Protection Act. But there is no comprehensive law that makes clear which of these individual laws may be applicable, nor is there any indication that overall coordination is a goal, thus leaving implementation, again, to mixed federal authorities.

## Ocean Thermal Energy Conversion

The surface waters of the world's tropical oceans store immense quantities of solar energy. Ocean thermal energy conversion (OTEC) technology could provide an economically efficient way to tap this resource to produce electric power and other products. The U.S. government spent over $200 million dollars in OTEC research and development from the 1970s to the early 1990s that produced useful technical information but did not result in a commercially viable technology. [19]

Early optimism about the potential of OTEC led to the enactment of the Ocean Thermal Energy Conversion Act of 1980, and the creation of a coordinated framework and licensing regime for managing that activity if and when economic considerations permitted. NOAA issued regulations to implement the Act, but because of investor risk for this capital-intensive technology and relatively low fossil fuel prices, no license applications were ever received and NOAA subsequently rescinded the regulations in 1996. Thus, the United States currently has no administrative regulatory structure to license commercial OTEC operations.

## Comprehensive Management for Offshore Renewable Energy

Offshore renewable technologies will continue to be studied as a means of reducing U.S. reliance on potentially unstable supplies of foreign oil, diversifying the nation's energy mix, and providing more environmentally benign sources of energy. Similar to offshore aquaculture described in Chapter 22, the offshore renewable processes described in this section present obvious examples of the shortcomings in federal authority when it comes to regulating specific new and emerging offshore activities. As long as federal agencies are forced to bootstrap their authorities to address these activities, the nation runs the risk of unresolved conflicts, unnecessary delays, and uncertain procedures. What is urgently needed is a comprehensive offshore management regime, developed by the National Ocean Council, which is designed to review all offshore uses in a greater planning context (see Chapter 6). A coherent and predictable federal

management process for offshore renewable resources that is able to weigh the benefits to the nation's energy future against the potential adverse effects on other ocean users, marine life, and the ocean's natural processes, should be fully integrated into the broader management regime.

**Recommendation 24–5. Congress, with input from the National Ocean Council, should enact legislation providing for the comprehensive management of offshore renewable energy development as part of a coordinated offshore management regime.**

*Specifically, this legislation should:*

- *streamline the process for licensing, leasing, and permitting renewable energy facilities in U.S. waters.*
- *subsume existing statutes, such as the Ocean Thermal Energy Conversion Act, and should be based on the premise that the oceans are a public resource.*
- *ensure that the public receives a fair return from the use of that resource and development rights are allocated through an open, transparent process that takes into account state, local, and public concerns.*

## MANAGING OTHER MARINE MINERALS

The ocean floor within the U.S. EEZ contains vast quantities of valuable minerals other than oil and gas, but the economics of recovering them, especially in areas far offshore, are not welcoming. These resources include more than two trillion cubic meters of sand and gravel reserves on the Atlantic shelf of the OCS alone, enormous phosphate deposits off the East Coast from North Carolina to northern Florida, titanium-rich heavy mineral sands from New Jersey to Florida, manganese nodules from South Carolina to Georgia, gold deposits off of Alaska, polymetallic sulfides off of Oregon, barite resources off of southern California, and quantities of cobalt and platinum in Hawaii. It is likely that substantial amounts of other valuable minerals will be identified in the future as exploration proceeds. Access to these minerals for commercial recovery, including offshore sand and gravel for use as construction aggregate, is through the competitive leasing process of the OCSLA.

In 1994, Congress authorized coastal communities to use sand and gravel from the OCS for public works projects without going through the statute's bidding process. Since then, MMS has used this authority to allow federal, state, and local agencies to mine OCS sand to protect shorelines, nourish beaches, and restore wetlands. Between 1995 and 2004, MMS provided over 20 million cubic yards of OCS sand for 14 coastal projects.[20] Louisiana alone is expected to seek millions of cubic yards of OCS sand for various barrier island restoration projects and levee systems.[21]

The depletion of OCS sand in state waters after decades of excavation, and growing environmental opposition to the activity in areas close to shore are exacerbated by the acceleration of erosion, ever-expanding coastal populations, and on the increasing vulnerability of fragile beaches, exposed beachfront property, and coastal-dependent industries to coastal storms. With the need for sand increasing and its availability in state waters decreasing, the OCS provides the obvious remedy. It is not, however, a remedy without associated problems.

MMS has numerous environmental studies underway or planned to evaluate the effects of OCS dredging on the marine and coastal environment and to identify ways to eliminate or mitigate harmful impacts. There remains, nevertheless, significant uncertainty about the long-term, cumulative impacts of sand and gravel mining on ocean systems and marine life. Changes in bathymetry can affect waves and currents in a manner that could increase shoreline erosion. Alterations to the ocean bottom can affect repopulation of the benthic community, cause increased turbidity, damage submerged resources such as historic shipwrecks, and kill marine organisms, including fish. For economic reasons, the demand for sand and gravel leases will most likely concentrate on OCS areas that are relatively close to shore. Some environmentalists and fishing representatives have opposed mining in state waters and may well oppose similar projects in adjacent federal waters.

A vital component of a national strategy to manage mineral resources located on the OCS is the need for an overall assessment of: (1) the nation's OCS mineral endowment (sand and gravel, as well as other strategic minerals vital to the long-term security of the nation); (2) the need for those resources (highest and best uses); (3) the long-term environmental impacts associated with use of those resources and; (4) the multiple-use implications of other uses of the OCS (including wind farms, cables, and pipelines). While resource managers have identified large volumes of sand off the nation's shores, the ultimate volumes that may be recovered remain unknown. Sand and gravel resources from the OCS are key to protecting the nation's shores and wetlands and to supplementing ever-diminishing onshore supplies of aggregate to support construction activities.

**Recommendation 24–6. The Minerals Management Service should systematically identify the nation's offshore non-energy mineral resources and conduct the necessary cost-benefit, long-term security, and environmental studies to create a national program that ensures the best uses of those resources**.

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