MMS OCEAN SCIENCE

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THE SCIENCE & TECHNOLOGY JOURNAL OF THE MINERALS MANAGEMENT SERVICE

Who We Are

Balancing Energy Needs

The Past, Present & Future

Ocean Science

Best Kept Secret

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MMS OCEAN SCIENCE is published bi-monthly by the Minerals Management Service to communicate recent ocean science and technological information and issues of interest related to offshore mineral recovery, ocean stewardship, and mineral revenues.

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ABOUT THE COVER
Fish schooling under a platform in the Gulf of Mexico.
Photo by Gregory S. Boland

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WHO WE ARE

INTRODUCING MMS OCEAN SCIENCE

What Federal agency has provided more than $135 billion dollars to the National Treasury over the past 20 years? What agency is responsible for the environmental safety of 30,000 miles of offshore pipeline? What agency is responsible for protecting the marine biological habitats and the marine archaeological treasures on the Outer Continental Shelf? Did you know that the answer to all of these questions is the Minerals Management Service (MMS)? Surprised? Most people are, and yet MMS plays a vital role in the Nation's ocean governance, energy future, environmental health, and financial stability.

At MMS, we oversee America's offshore energy resources while ensuring the protection of the marine environment and underwater archaeological treasures. We manage programs to collect technical and scientific information, through federally funded research projects, to make informed decisions about where, when, and how the Nation's offshore minerals are produced. The MMS not only leases the rights to oil and gas deposits, but also to sand and gravel used for coastal restoration projects. Onshore, as well as offshore, MMS collects revenues from the production of resources on Federal and tribal lands.

"Decisions we will make tomorrow, or next year, will have a tremendous effect on the Nation our children will inherit," says Johnnie Burton, Director of MMS. "MMS-funded research is gathering the information we need to make informed decisions about our energy needs, our resource reserves, and our effect on the environment."

To share this information, *MMS OCEAN SCIENCE* will focus on the science and technology used or funded by MMS – whether it concerns environmental questions such as oil spills and wildlife protection, technological advancements in offshore oil drilling such as cell spar platforms, or the results of studies such as the effect of offshore structures on the surrounding ecosystem.

Don't be surprised next time by all that MMS does. Be informed!

THE MINERALS MANAGEMENT SERVICE

BALANCING ENERGY NEEDS & ENVIRONMENTAL HEALTH

How will the future energy needs be met? How much oil do we have and when will it run out? How can we balance energy needs, environmental health, and expanding development – especially on the Outer Continental Shelf (OCS)? These are hard questions. Finding the answers to these questions is part of the job of the Minerals Management Service (MMS).

What does the OCS and environmental health have to do with minerals management? There is one major act or legal mandate which serves as the basis for the offshore program of MMS, a bureau of the U.S. Department of the Interior – the Outer Continental Shelf Lands Act or OCSLA. The Outer Continental Shelf Lands Act of 1953 called for the Federal Government to manage the oil, gas, and other mineral resources of the OCS to ensure national security, reduce dependence on foreign sources, protect the Nation's environmental health, and conserve the precious resources of the OCS.

An additional 14 other mandates govern the actions of the MMS including the National Environmental Policy Act (NEPA), the Coastal Zone Management Act (CZMA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), and the Federal Oil and Gas Royalty Management Act (FOGRMA). Based on those mandates, the MMS was created by Secretarial Order 3071 in January 1982.

There are two programs of the MMS: Minerals Revenue Management and Offshore Minerals Management. The Minerals Revenue Management program is headquartered in Washington, D.C., but operated out of the Federal Center in Lakewood, Colorado.

The Minerals Revenue Management (MRM) program collects, accounts for, and distributes revenues associated with mineral production from leased Federal and Indian lands. The program processes more than 200,000 transactions every month – totaling over $300 million – from approximately 80,000 Federal and Native American Indian leases. Mineral lease bonuses, rentals, and royalties managed by the MMS are a major source of non-tax revenue for the Federal Government. Since 1982, the MRM program has distributed approximately $135 billion to Federal, State, and Indian accounts, including $75.4 billion to the General Fund of the U.S. Treasury (this includes a one-time disbursement of almost $900 million to the Environmental Improvement and Restoration Fund); $13.5 billion to 38 states; $27.9 billion to the Land and Water Conservation Fund, the National Historic

Above: The Outer Continental Shelf is divided into sections or planning areas, which are further divided into approximately 3-mile by 3-mile blocks. These blocks are leased by MMS for the recovery of mineral resources.

MMS Responsibilities

- Statutory mandate
  - ✓ Expedite exploration & development on the OCS
  - ✓ Protect human, marine, & coastal environments
  - ✓ Obtain fair & equitable return for the public
  - ✓ Preserve & maintain competition
- Balance objectives under all market conditions

Manage the Nation's offshore resources; protect the ocean environment

Excerpted from U.S. Code Title 43, Chapter 29, Subchapter III, Sec. 1331 (Definitions)

(a) The term ''Outer Continental Shelf'' means all submerged lands lying seaward and outside of the area of lands beneath navigable waters as defined in section 1301 of this title, and of which the subsoil and seabed appertain to the United States and are subject to its jurisdiction and control…

Preservation Fund, and the Reclamation Fund; and $3.4 billion to the Department's Office of Trust Funds Management on behalf of 41 Indian tribes and 20,000 individual Indian allottees.

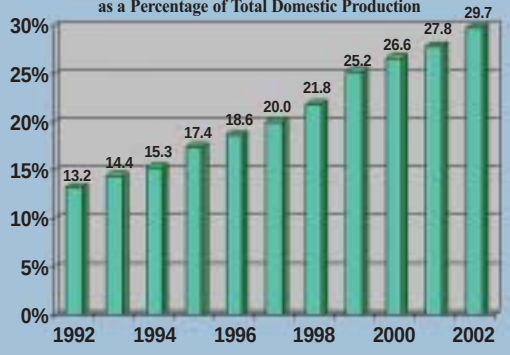
Offshore Minerals Management, headquartered in Washington, D.C., and Herndon, Virginia, is responsible for the leasing and oversight of mineral operations in three regions: 1) the Alaska Region, based in Anchorage; 2) the Pacific Region, based in Camarillo, California; and 3) the Gulf of Mexico Region (includes the Atlantic Planning Areas), based in New Orleans. Within the Gulf of Mexico Region alone, over 7,500 leases and 4,000 offshore oil and gas structures are managed.

Offshore Minerals Management is responsible for all aspects of OCS resource management from the initial geological and geophysical analysis of the resource through the regulation of mineral development and lease abandonment activities. In addition to oil and gas resources, the MMS leases lands for the recovery of sand and gravel used to protect the Nation's shores and wetlands. An active Environmental Studies Program sponsors research in the marine, social, and cultural environments that provides important scientific information to support program decisions.

"The oceans off our coasts are a national resource that is a vital component of our energy and economic security," says Johnnie Burton, Director of the MMS. "Public lands offshore have been a secure source of oil and gas for over 50 years and today the Outer Continental Shelf is one of the largest sources of oil and natural gas for our people – currently providing about 30 percent of the oil and 23 percent of the natural gas that we produce domestically. This percentage is likely to increase in the coming decade because over 60 percent of the Nation's remaining oil and gas is offshore." *(see chart above right)*

"In addition to an energy and recreational resource, our coastal areas are also highways of national and international commerce, a growing source of food, and the front line in our national defense effort," says Burton. "As a land manager for the mineral resources of our offshore areas – over 1.7 billion acres – the MMS, in conjunction with other Federal agencies, has to make choices on a daily basis that balance these competing interests of energy production, natural resource preservation, vessel traffic, recreational activity, commercial fishing, and National defense."

"The bureaus of the Department of the Interior conduct extensive multiple-use planning that involves input from all stakeholders," says Burton. "When environmental conditions warrant protection, the Department recommends no development or requires special mitigation. Where we do have offshore production, a billion dollars of these revenues per year goes into the Land and Water Conservation and National Historic Preservation programs. These programs are directly aimed at improving our environment."



THE PAST, PRESENT & FUTURE

PROTECTING

AMERICA'S MINERAL & HUMAN RESOURCES

To ensure we have heat for homes or gas for cars in the future, must we sacrifice the historic treasures of the ocean bottom? Would you sacrifice the safety of offshore workers? Would you sacrifice the health of whales? Dolphins? No? Neither would the Minerals Management Service (MMS), which was created to make certain that the energy resources are developed in ways that won't sacrifice the environment and natural resources, the human resources, the historic treasures, the marine animals, or the future.

Protecting the Environment and Natural Resources

The MMS Environmental Studies Program (ESP) provides the best available scientific information to support decisions for the offshore gas, oil, and marine minerals program. Decisions regarding future development are based on that information, with the purpose of protecting the environment while still allowing the development of resources to meet future needs.

In addition to the Environmental Studies Program, the MMS Technology Assessment and Research (TAR) Program supports research into technical and safety issues including operational safety, pollution prevention, and oil spill response and cleanup capabilities.

Above: Seen here are settling plates attached to a cross bar on a platform. These plates are used to measure the rate of growth of barnacles, algae, and other encrusting marine life. Note the extensive growth on the platform.

Over the last 13 years, the MMS conducted 150 unannounced oil spill drills to test the ability of offshore oil, gas, and pipeline operators to contain or mitigate and clean up oil spills.

The operators follow procedures that are defined in the Oil Spill

Response Plans filed with the MMS for each offshore facility. Operators are given a scenario with hypothetical weather conditions and are tested on their response efficiency. The MMS and other agencies, sometimes including State partners, participate in and witness the response drills first hand. The tested operators are then required to submit a written report on their response within 15 days. The MMS responds with an evaluation with critiques and recommendations.

Protecting the Nation's Human Resources

The Offshore Minerals Management Program conducts more than 16,000 inspections a year to ensure oil and gas worker and operational safety and the protection of marine, coastal, and human environments.

The MMS has very strict requirements for making certain the proper safety equipment is used in drilling and production operations. This equipment must be tested thoroughly and properly maintained. Workers are also required to have the proper training. The MMS's requirements, for example, include the use of blowout preventer devices (BOP's) that can withstand enormous pressures --- up to 15,000 psi (pounds per square inch). As a result, blowouts are few and usually contained instantly.

The MMS inspectors have the authority to shut down an operation immediately if it is being conducted improperly or without proper equipment. Even for minor accidents, MMS will conduct an investigation and publish safety alerts to encourage the rest of industry to strive for better compliance. Each year, MMS conducts a review of the operational safety of each of the approximately 100 operators, focusing on their compliance record and opportunities for improvement (often a proactive step based on a worldwide review of problems and advances in industry). More serious violations are subject to civil penalty proceedings. In fact, MMS fined 14 operators $2.2 million in 2003, in addition to requiring the problems be fixed.

Working together with industry is just one of the many methods MMS employs in the goal of protecting both people and the environment.

Protecting the Nation's Historic Treasures

The MMS requires oil and gas industries to conduct sophisticated underwater surveys of areas where they propose drilling operations. They must submit an archaeological analysis of the results of those surveys. The MMS also requires the same archaeological surveys for sand and gravel dredging operations.

Thus far, around 300-400 ships ranging from the 16th to the 19th century have been discovered on the Gulf of Mexico's continental shelf. That's a lot of history!

One of the most significant finds is the *Josephine,* a side-wheel steamship that belonged to Charles Morgan's Louisiana and Texas Railroad and Steamship Company. The vessel sank as she returned from Cuba in January 1881. Because the *Josephine* is the most intact side-wheel steamer ever found, she provides historians a great opportunity for research.

As operations move further into deep water, more wrecks are being discovered. The most exciting recent discovery was in 2002, when the remains of the only German U-Boat sunk in the Gulf of Mexico were discovered in over 5,000 feet of water, not far from the last ship she sank.

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Protecting the Nation's Marine Animals

The MMS ensures compliance with environmental laws that protect marine animals and their habitat.

New species of animals that eat dissolved gases were discovered in 1982 by two independent teams. These chemosynthetic communities are densely populated by animals that are quite large as deep-sea creatures go. They extract their energy needs by chemosynthesis instead of photosynthesis and thrive in a place of perpetual darkness. The MMS has developed rules that require the oil and gas industry to protect these communities, while still allowing for the development of energy reserves.

Chemosynthesis: Synthesis of carbohydrate from carbon dioxide and water using energy obtained from the chemical oxidation of simple inorganic compounds.

Since the early 1970's, the MMS has actively been involved in a program of protective activities at the East and West Flower Garden Banks, the northernmost coral reef ecosystem on the North American continental shelf. Researchers have collected data, including water quality, light intensity, coral growth rates, bleaching, algal cover, encrusting growth of coral, and water temperature. The results? No significant long-term upward or downward trends in growth rates were evident—growth was variable but stable. These observations are documented in the MMS study *Long-term Monitoring of the East and West Flower Garden Banks National Marine Sanctuary, 2000-2001* (MMS Publication 2003-031).

Through the Environmental Studies Program, MMS has funded over $70 million in marine research on the distribution, abundance, and behavior of marine mammals and the potential effects of human activities on their habitat. The potential effects of noise on whales and dolphins is of particular interest to MMS. Both whales and dolphins locate objects and navigate by sound (echolocation). The MMS, along with the NOAA Fisheries and the Office of Naval Research, is studying whether underwater noise from oil and gas operations could be affecting marine mammals, such as sperm whales.

The MMS, in conjunction with several universities, is gaining insight into migratory birds and their interactions with oil and gas structures in the Gulf of Mexico. Early and very tentative results suggest that exhausted migrating birds benefit from having offshore platforms on which to rest as they fly to their breeding grounds.

Protecting the Nation's Future

The future of the country depends on the protection of the energy resources, the health of the people, and the state of the environment. The MMS contracts for research to ensure that informed decisions are made to keep that future sound.

"MMS has a responsibility to thoroughly review new technology for safety and reliability," said MMS Director Johnnie Burton. One way the MMS is helping the future is by approving technological advances that make oil and gas exploration more efficient and cost effective, while remaining environmentally sound. In January 2003, the MMS announced that it had given approval for use of the world's first cell spar in a deepwater oil and gas project. Kerr-McGee's "Red Hawk" project will be located in 5,300 feet of water.

The MMS supports marine environmental monitoring studies to focus on assessing the long-term and short-term environmental effects associated with OCS production activities. These monitoring efforts ensure that present measures are working and are a source of continued improvement in the protection of marine habitats for the future.

Right: Kerr-McGee's "Red Hawk" project cell spar. This cell spar will measure 64 feet in diameter and 480 feet in length. It will be composed of seven tubes, each 20 feet in diameter, with a center tube surrounded by the other six tubes, all connected by structural steel.

As present day natural gas reserves are depleted, alternative sources must be sought. One potential source is methane hydrates, an ice-like material that traps gas in its structure. The MMS is supporting research into the potential of this resource to provide natural gas in the future.

"As the Nation looks for alternative sources of energy, we face an ongoing challenge of meeting today's needs," said MMS Director Johnnie Burton in a recent speech. "To preserve our country's standard of living, fuel a growing economy and protect the homeland, we must meet our increasing energy demands through new and innovative exploration… but environmental protection must accompany energy production."

The balance of environmental protection and energy production is the challenge of the MMS, as well as its mission. The future of the environment may depend on its fulfillment.

PARTNERING TOWARD THE FUTURE

OCEAN SCIENCE

As a charter member of the National Oceanographic Partnership Program (NOPP), a collaboration of 15 Federal agencies established by Congress to provide leadership and coordination of national oceanographic research and education programs, MMS is helping to improve coordination across the oceanographic community. The MMS has served as co-sponsor of a number of NOPP-affiliated research projects. Most recently, and in light of the November 2003 release of the National Research Council's report, *Exploration of the Seas,* MMS partnered with NOAA's Office of Ocean Exploration to initiate a study of the archaeological and biological significance of deepwater WWII shipwrecks in the Gulf of Mexico. Partnering through NOPP, MMS was able to address specific mission-related science needs while at the same time answering the Nation's call to explore the sea.

Looking even further into the future, MMS is one of seven NOPP members comprising the Executive Committee of the Ocean.US., the National Office for Integrated and Sustained Ocean Observations. Stemming from a Congressional request for "a plan to achieve a truly integrated ocean observing system," NOPP established Ocean.US to serve as the Nation's focal point for developing an Integrated Ocean Observing System, or *IOOS.* Participation in the development of *IOOS* allows MMS to facilitate a clear line of communication between its developers and its eventual uses in the OCS oil and gas and marine minerals industries.

"The National Oceanographic Partnership Program has emerged prominently, affording our community a level of direction and visibility heretofore unseen."

– Admiral James D. Watkins, USN (Ret.),
Chairman, U.S. Commission on Ocean Policy

MMS ASKS THE HARD QUESTIONS

DID YOU KNOW?

What do you think of when you hear Minerals Management Service? Do you think oil, leases, or minerals? Probably so. But would you think about coral reefs? Beaches? Whales? Migratory birds? Deep-sea chemosynthetic communities? Civil War shipwrecks? Meteorology? Probably not. Yet each of these resources is studied and protected as part of MMS's mission to manage the Nation's offshore resources and protect the ocean environment. To fulfill that mission, MMS and its partners are asking hard questions about how oil and gas exploration and production are affecting the diverse elements of the Outer Continental Shelf.

What can we do with old oil platforms?

There are over 4,000 oil and gas structures in the Gulf of Mexico with more than 100 added each year. But each year, 90-100 platforms are also removed from service. How can these platforms be decommissioned in a way that can enhance the environment? Through the "Rigs to Reefs" program, MMS encourages the use of old platforms as artificial reefs. The hard surfaces of the rigs serve as perfect homes for encrusting organisms such as spiny oysters, barnacles, sponges, and corals that otherwise have no place to live.

Under the Rigs to Reefs program, oil and gas companies may donate platform structures that will no longer be used to the nearest State. The State, which receives title to the structure, can then designate it for use as an artificial reef. Because the company will not have to dispose of the platform in a more expensive and time-consuming manner, the company will usually donate 50 percent of the savings they realize to the State's Rigs to Reefs program. The MMS serves as an informal advisor to both the company and the States regarding the possibilities of donating platforms when leases are terminated. Three of the five coastal States bordering the Gulf of Mexico have Rigs to Reefs programs.

PLATFORMS SET STAGE FOR INTRICATE HABITAT

BEST KEPT SECRET FINDS FISH & FISHERMEN

Want to find the hottest fishing spot in the Gulf? Try an oil and gas platform! As many commercial and recreational fishermen and divers have discovered, platforms can be teeming with life. But just what is the impact of the platforms on the economic health of the fishing and tourism industries? And what is the impact on the ecological health of the surrounding marine life? Finding out is part of the mission of the Minerals Management Service (MMS).

The economic value of offshore structures to recreational fishermen first came to national attention in the early 1970s. This awareness led to the enactment of the National Fishing Enhancement Act (NFEA) in the 1980s. The legislation encouraged states to develop programs that would create artificial reefs from oil and gas platforms that are no longer used for production. Louisiana, with input from commercial and recreational interests and regulatory agencies, became the first state to develop such a program, followed by Texas and Alabama.

By the end of 2002, 188 oil and gas structures in the Gulf of Mexico had been converted into artificial reefs. Although as many as 30 per year continue to be converted, this number is limited by the depth of older rigs. Platforms that were erected in less than 100 feet of water have navigation, clearance, and liability issues that prohibit or inhibit their conversion.

In an effort to understand the effects of oil and gas structures – especially those converted to reefs – on both the economic and surrounding marine life of the area, the MMS has funded studies to provide insight and guide future decisions about their use.

Measuring the number and varieties of fish that surround platforms is not only important from an ecological standpoint, but it is also important economically. A study (MMS Publication 2003-009) funded through the Coastal Marine Institute (CMI) at Louisiana State University (LSU) examines the fish population around platforms in the Gulf of Mexico. Scientists from LSU and Texas A&M found between 10,000 and 20,000 fish around the average platform located in depths over 100 feet. More importantly, it is estimated that over one million red snapper, a valuable sport and food fish species, live around the Gulf platforms.

The economic impact of oil and gas platforms on the recreational fishing and diving industries has been the subject of studies for over 20 years. In the 1980s, one such study estimated that the platforms were being used by 70 percent of Louisiana fishermen. To fully understand the economic impact, MMS began a study (MMS Publication 2002-010) that interviewed almost 10,500

For more information on the economic impact of oil and gas platforms:

MMS Publication 2002-010

Economic Impact of Recreational Fishing and Diving Associated with Offshore Oil and Gas Structures in the Gulf of Mexico

Website: www.gomr.mms.gov/homepg/regulate/environ/techsumm/2002/2002-010.html

MMS Publication 2003-009

Rigs and Reefs: A Comparison of the Fish Communities at Two Artificial Reefs, a Production Platform, and a Natural Reef in the Northern Gulf of Mexico

Website: www.gomr.mms.gov/homepg/regulate/environ/techsumm/2003/2003-009.html

MMS Publication 2002-004

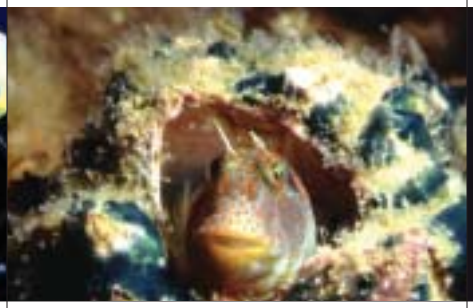
Gulf of Mexico Fish and Fisheries: Bringing Together New and Recent Research

Website: www.gomr.mms.gov/homepg/regulate/environ/studies/2002-004.pdf

private fishermen, charter boat fishermen, party boat fishermen, and divers. Follow-up interviews were conducted to further differentiate the expenditures. It was found that $172.9 million in trip-related costs and $640 million in equipment costs were being added to the economic base of those states. That is the equivalent of 5,560 full-time jobs.

According to MMS studies, the underwater support structure or "jacket" of a typical platform – whether currently operating or converted to a reef – provides 2-3 acres of hard substrate or "habitat" for marine life and seasonally hosts 10-20 thousand fish. This density of life is very important for fishermen because the Gulf, for the most part, has very little rocky or reef habitat. Researchers have estimated that fish densities around platforms are 20-50 times higher than in nearby open water – making them the most popular fishing spots in the Gulf.

Whether you are a recreational or commercial fisherman, a diver, or just interested in the ecological health of the Gulf of Mexico, the marine habitat provided by oil and gas platforms, both used and new, is important to the future of the Gulf ecosystem and your enjoyment of the area. The MMS studies that are currently underway will help understand and protect that future...and that hot fishing spot you just found!



Manage the Nation's offshore resources; protect the ocean environment

The Tension Leg Platform, Ursa, in the Gulf of Mexico

NEW WAVES

Late-breaking News & Information

MMS Announces Funding for Coral Study

The Minerals Management Service announces the recent funding of a $1.4 million study of the deepwater coral *Lophelia.* Scientists conducting this new study will use a manned submersible to first identify and explore locations with *Lophelia* in water depths greater than 1,000 feet. They will then begin experiments to determine why these corals grow in some places and not others.

This upcoming study will contribute to one of the fundamental missions of the Minerals Management Service: to identify and consider the protection of new and unknown sensitive biological habitats. For more information on the *Lophelia* coral study, visit *www.gomr.mms.gov/homepg/regulate/environ/ongoing_studies/gm/GM-03-02.html.*

MMS Works with Mexican Scientists

To gain a greater understanding of the entire Gulf of Mexico, MMS is funding the collection of information about ocean currents in Mexican waters. Through collaboration with Mexican scientists, instruments are currently deployed in Mexican territory and are collecting data simultaneously with other studies in U.S. waters. The MMS uses this information to predict the movement of oil spills, should one occur, which allows for better response to an incident. Read more about this collaborative research at: *www.gomr.mms.gov/homepg/regulate/environ/ongoing_studies/gm/GM-02-x14.html*

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