

MIMS OCEAN SCIENCE

VOLUME 1 ISSUE 4
JULY/AUGUST 2004

THE SCIENCE & TECHNOLOGY JOURNAL OF THE MINERALS MANAGEMENT SERVICE

**Collaboration
for Workable
Solutions**

**Cooperation
in Research**

**Pooling Our
Resources**

**San Jacinto
Prospect**

**Cooperation
in Education**

**Working
Together for a
Safer World**



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Volume 1 Issue 4

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

Top: Juvenile cowcod (*Sebastes levis*) and white anemones (*Metridium* sp.) found on a pipeline between Platforms Gail and Grace. Photo Courtesy of Milton Love.

Bottom: SCUBA diver conducting platform surveys around legs of Platform Gina. Photo by James Forte.

Both photos are from the Pacific Region.

All photos courtesy of Minerals Management Service unless otherwise noted.

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MMS OCEAN SCIENCE

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www.mms.gov

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COLLABORATION FOR WORKABLE

The ocean covers 71% of the earth's surface. The influence that the ocean has on all life makes it clear that the management of our natural resources must not be a singular effort, but a united front.

Effective protection and management involves local, national, and worldwide partnerships that build upon the value of the ocean's complex ecosystems.

Developing workable solutions for the complex problems that arise when balancing the development of the Nation's marine mineral resources with stewardship of the surrounding ecosystems is a primary goal of the Minerals Management Service (MMS). To accomplish this enormous task, MMS has formed partnerships, both here and abroad. Industry experts, universities, States, other agencies, and even other countries have been enlisted to help gather, organize, and synthesize knowledge of the communities – human, plant, animal, and mineral – that depend on the ocean.

Collaborations with others make better use of monetary resources by spreading the costs and benefits of research among several entities. In an era of mandatory budgetary restraint, cooperation between Federal agencies allows each agency to accomplish more with the resources available. Fostering joint ventures between MMS and States offers an opportunity to enhance the knowledge and capabilities of both. Working with other countries allows for the sharing of information from past experiences. This issue of *MMS Ocean Science* focuses on some of the collaborations between MMS and others to enhance our understanding of the Outer Continental Shelf and promote the safe development of the offshore mineral resources.

Whatever happens to one system, community, or country has an effect, either negative or positive, on other systems, communities, or countries. This is especially true in nature, where one decision, or one mishap, can have unforeseen results even years later. Only

Left: Kelp bass (*Paralabrax clathratus*) under Platform Gina in Santa Barbara Channel. Photo by James Forte. Below left: A pirate flycatcher from Mexico resting on a Gulf of Mexico platform. This is only the fourth known occurrence of this species in the U.S. Photo courtesy of Bob Russell. Below right: Seastar and anemones between Platforms Gail and Grace in Santa Barbara Channel. Photo by Milton Love. Bottom: Platform in the Gulf of Mexico.



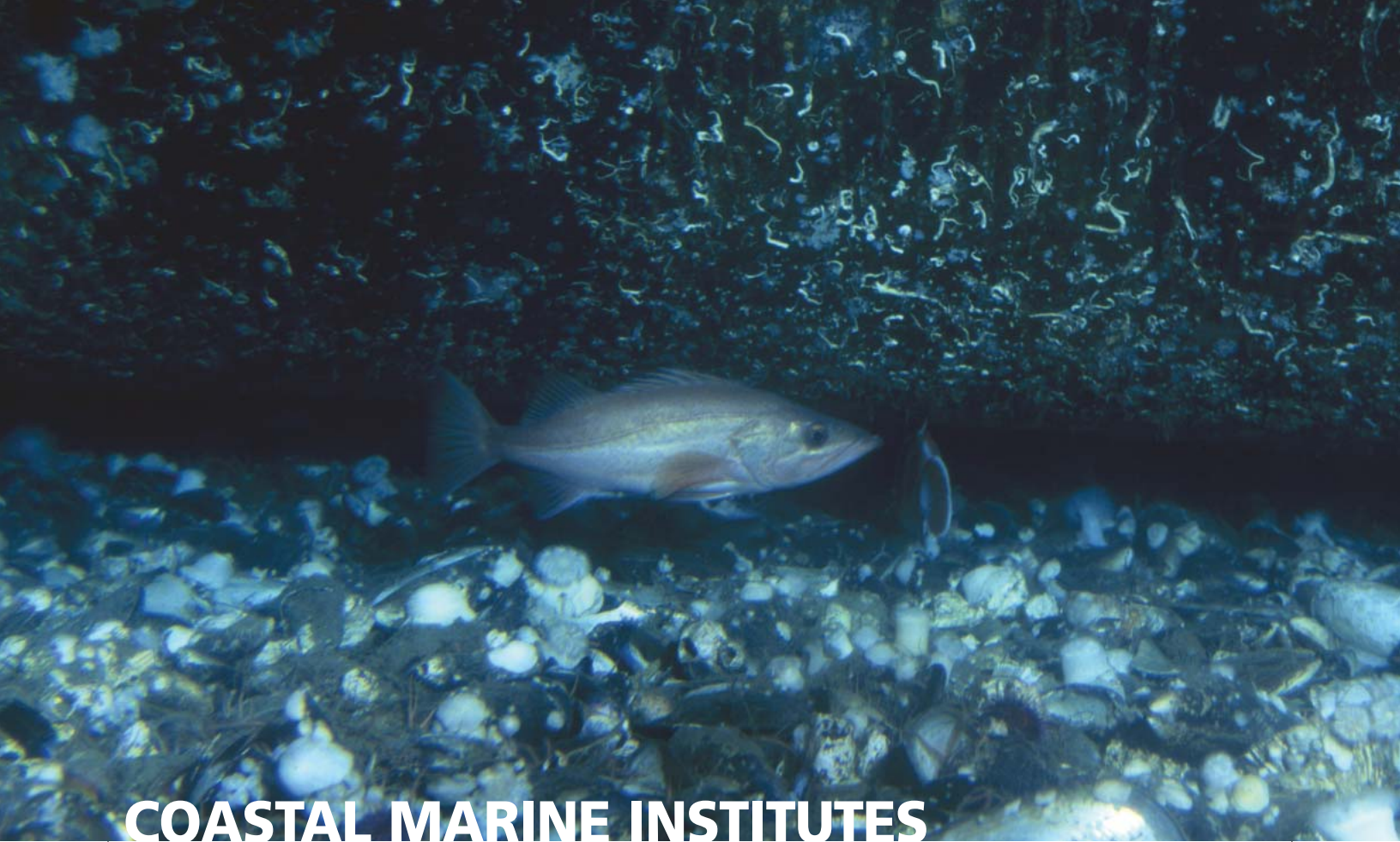
SOLUTIONS



by pooling our resources, knowledge, and ideas can we meet the challenge of providing energy for the future while protecting the natural resources for our children and their children.

FOR MORE INFORMATION:

Website: <http://www.mms.gov/offshore/Partnerships.htm>



COASTAL MARINE INSTITUTES COOPERATION IN RESEARCH

Protecting the environment requires sound scientific information from experts familiar with local regions. Universities are a major source of expertise to provide the needed information for making management decisions. The Minerals Management Service (MMS) has teamed with three State universities jointly to support research that is of interest to both MMS and the States. Coastal Marine Institutes (CMI's) were formed at the Louisiana State University, the University of Alaska, and the University of California at Santa Barbara. Jointly funded studies have covered a broad array of topics ranging from bird migration patterns in the Gulf of Mexico to the study of whale habitats in the Arctic.

The key to effective management of the Nation's offshore resources and ecosystems is an understanding of the consequences of the interaction of its complex environments, humans, and technology. Each CMI facilitates student

research and training; acts as a hub for the production of basic scientific information; allows for investigations of mutual interest to MMS and the States; tests innovative methodologies to address current problems; and promotes further interdisciplinary research involving MMS and academic institutions. The formation of the CMI's allows MMS regional offices to tap into the expertise of local universities and provide important research that spans many disciplines while serving the interests of both the States and MMS.

Above: Boccacio (*Sebastes paucispinos*), Platform Hidalgo. Photo by Milton Love.

Through these and other research studies, scientists and decision makers gain a better understanding of "marine, coastal, or human environments affected or potentially affected by offshore oil and gas or other mineral exploration and extraction." A better understanding leads to better decisions which, in turn, protect those ecosystems that may be affected.

FOR MORE INFORMATION:

**Louisiana State University
Coastal Marine Institute**

Website: <http://www.cmi.lsu.edu/>

**University of Alaska
Coastal Marine Institute**

Website: <http://www.sfos.uaf.edu/cmi/>

**UC Santa Barbara
Coastal Marine Institute**

Website: <http://www.coastalresearchcenter.ucsb.edu/cmi/>

...a better understanding leads to better decisions...

Louisiana State University CMI

The CMI at Louisiana State University was formed as a partnership between the University and MMS in 1992 to “collect and disseminate environmental information needed for Outer Continental Shelf (OCS) oil and gas and marine minerals decisions; address local and regional OCS related environmental and resource issues of mutual interest; and strengthen the MMS-State of Louisiana partnership in addressing the need for OCS oil and gas and marine minerals information.” A review of the first six years of this partnership is available in MMS Publication 2001-062.

Funded studies have investigated the role of platforms as artificial reef habitats, both for fish populations and as hard substrate, in locations where the surrounding surface is mostly soft mud. One study has shown that a typical 8-leg platform structure serves as home for 12,000 to 14,000 fish. Other studies are targeting the question of whether platforms are serving as productive habitat or simply attract fish.

The MMS has recently announced a new three-year MMS/CMI study investigating the occurrence and origins of reef corals on offshore platforms. To discover if newly settled corals come from the Flower Garden Banks (more than 300 miles away) or from other platforms that are coral habitats, diving scientists attach settling plates to a platform structure. The ceramic tiles will be collected later for researchers to look for tiny coral communities whose DNA will be used to determine the origin of the colony.

The OCS undersea environments are not the only ecosystems being studied. To gain a greater insight into migratory birds moving across the Gulf of Mexico and their interactions with offshore production platforms along the way, MMS and CMI are conducting a joint study of migratory birds that winter in the



Left: A belted kingfisher from Mexico stops on a platform for a mid-day nap before continuing to the Texas Coast.

Above: Continental peregrine falcon populations once approached extinction, but thousands of this species now use platforms for resting and feeding during their southward fall migration. Photo by Dave Patton.

tropics (known as neotropical migrants). The birds are vital to the ecosystem, consuming insects, distributing seeds, and serving as food for other predators. The flight pathway of many of these birds is over the roughly 4,000 oil and gas structures in the Gulf, which make up the largest artificial island system in the world. Through cooperation with several oil companies, investigators were able to live on platforms during the migration and observe the birds that came to rest. Some exciting discoveries include the use of the platforms by peregrine falcons during the fall for resting and hunting. During poor weather, many of the migrant birds use the platforms as safe havens to wait out the storm.



The University of Alaska CMI

The CMI at the University of Alaska, in cooperation with MMS, studies the rich environmental ecosystems in the Alaska Region and the potential effects of human activity. There are vast energy resources to be explored in the oceans off the coast of Alaska. But the ocean, the indigenous peoples who inhabit the coast, and the wildlife needed to survive are part of a delicate ecosystem that may be affected by that exploration.

The migratory and feeding patterns of the Beluga whale in the Eastern Chukchi Sea are being studied through the use of satellite tracking. Small instruments, or tags, attached to the back of each whale transmit the whale's location by sending a signal to a satellite. The tags provide much-needed information about their movements, dive habits, feeding grounds, and population concentration, which can be used to determine how we might best protect these valuable animals from the effects of man's intrusion.



Beluga whales swimming in the open ocean.

Another migratory animal of interest is the king eider, an Arctic duck, that moves east along the Beaufort Sea during the spring to nesting areas in Russia, Alaska, and Canada. The eiders return to the Chukchi and Bering Seas in the fall. Satellite transmitters are implanted into the eiders to trace their migration. During the migration, the king eiders form large flocks that could be more vulnerable to human activities. Through our understanding of these patterns, methods to best protect the eiders can be developed.

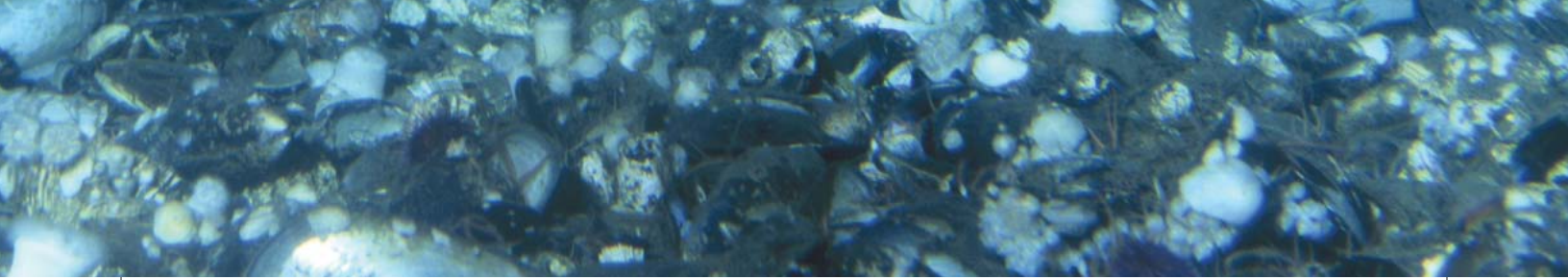
The Alaska Sea Ice Atlas updates the 1983 Marine Ice Atlas and brings it to the World Wide Web environment (<http://holmes-iv.engr.uaa.alaska.edu/>). The atlas presents material of interest to a wide audience, from the ice conditions that are important for marine transportation in the Beaufort Sea to a section with Alaska native language ice terms and pictures of the many types of ice important to the residents in their daily lives and subsistence hunting activities.



King eider being released after having a satellite tag implanted. Photo by Abby Powell, University of Alaska, CMI.



This satellite image shows a portion of the Beaufort OCS region. The white offshore patterns are sea ice, showing the complex interaction of ocean currents, winds, and sedimentation. Just east of Herschel Island, the large McKenzie River empties an extensive freshwater, sediment-laden plume as do other rivers along the coast. From a study report by Mark Weingartner, University of Alaska.



The formation of the CMI's allows MMS regional offices to tap into the expertise of local universities and provide important research...



Above: Juvenile vermilion rockfish (*Sebastes minatus*), club anemones (*Corynactis californica*), white anemones (*Metradium sp.*), and seastars (*Pisaster sp.*). Bottom of Platform Grace. Photo by Donna Schroeder.

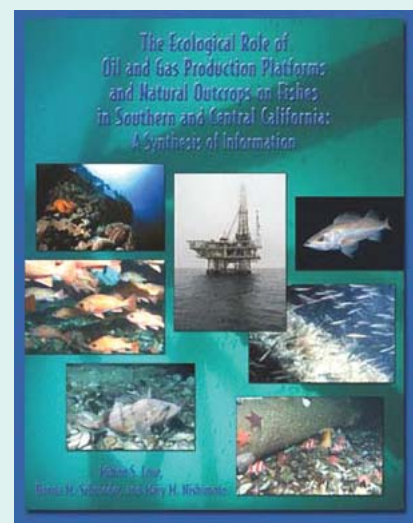
The Coastal Research Center of the Marine Science Institute at the University of California at Santa Barbara

The Coastal Research Center of the Marine Science Institute at the University of California at Santa Barbara is the CMI that focuses on issues within the Pacific Region. Since 1995, MMS through the CMI, the Biological Resources Division of the U.S. Geological Survey and, most recently, the California Artificial Reef Enhancement Program, have funded research on the fishes that live around the platforms and on natural rock outcrops of central and southern California. The beams and vertical pilings form the jacket of the platform, which provides important habitat for a wide variety of fish. When production from the platforms ends, the platform is required to be removed within one year. The key question of interest is whether removal of these platforms will affect fish populations. Findings from this study show that the platforms provide a refuge for adult fish because fishing is not allowed near the platforms. They also appear to be nurseries for young rockfishes.

At the 1998 National Ocean Conference (NOC) in Monterey, California, participants identified

biotechnology as a high-priority issue for the Nation's future. Recognizing the potentially harmful impacts that bioprospecting or bioharvesting could have on a region's biodiversity and ecology, MMS is investigating the use of OCS oil and gas platforms as renewable sources of material. This type of research would reduce the need to collect from natural habitats, thus preserving biodiversity and populations of marine organisms. The MMS and this CMI began to investigate the potential of oil and gas platforms as a source of marine bioproducts in 2000. To date, organisms such as algae, bryozoans, mollusks, and bacteria have been identified as potentially suitable for pharmaceutical applications.

"The Ecological Role of Oil and Gas Production Platforms and Natural Outcrops on Fishes in Southern and Central California: A Synthesis of Information" found at <http://id-www.ucsb.edu/lovelab/Report.html>



POOLING OUR RESOURCES

Coastal States face many challenges in the management, research, and protection of the ocean and coastline. The protection of marine life, natural habitats, and wildlife requires knowledgeable experts who understand the value of preserving the Nation's coastlines. These experts are found in all walks of life and share the common goal of safeguarding the delicate balance between water and land.

Sand and gravel resources located in Federal waters have been identified as a solution to States' eroding beaches and coastlines. Currently, 14 coastal States partner with the Minerals Management Service (MMS) to identify sand deposits in Federal waters. The sand may be suitable for beach replenishment and nourishment, or wetlands and storm protection efforts. The partnerships result in jointly collected geological and environmental research on the complex relationships between ocean, land, and wetlands ecosystems. With help from States, MMS is able to keep the concept of a larger ecosystem at the forefront.

Currently, the Virginia Institute of Marine Science (VIMS) and MMS are monitoring the physical and biological

changes at Sandbridge Shoal to study the effects of offshore sand dredging on the local biology and wave patterns. Sandbridge Shoal, located south of Virginia Beach and just offshore of Sandbridge Beach, has been the primary source of material for beach nourishment and storm protection projects at Sandbridge Beach and at the U.S. Navy's Dam Neck training center. This cooperative effort will help avoid environmental damage to the marine ecosystem and physical character of the area, while maintaining the shoal as a source of sand for future planned nourishment efforts.

The State of Louisiana has a major coastal landloss problem; more than 30 square miles of coastal land is being lost per year, severely affecting the storm-buffering capacity and the protection that nearshore barrier islands provide to human populations, oil and gas infrastructure, inland bays, estuaries, and wetlands. Cooperative geological and geophysical studies conducted by the State and MMS identified Ship Shoal, a submerged feature located offshore, the central Louisiana coast, as an ideal source of material for use in restoration and nourishment projects along the Louisiana coast within the Terrebonne and Barataria Basins. Now, a three-year cooperative environmental effort co-funded by the Louisiana Department of



Above: Map indicating MMS-State Cooperative Agreements and MMS-State Sand Resource/Environmental Study Areas along US coasts. Right: Photograph of the beach at Cape Hatteras and the breached shoreline following Hurricane Isabel, September 2003.



Natural Resources and MMS will provide the information needed to protect valuable shrimp and other fish resources on the shoal, as well as maintain the physical nature of

the shoal and the inshore area, while allowing material to be used for nearby barrier island nourishment and wetland protection projects. A related cooperative effort between MMS and Louisiana State University will provide additional information on shrimp populations that reside on the shoal.

Another exciting partnership between MMS and State agencies is the Seafloor Earthquake Monitoring System (SEMS) project. Knowledge about the earth's movement underwater during earthquakes is very limited, and data on how seafloor sediments react to



Left: Installation of seismic probe near Platform Grace.

FOR MORE INFORMATION:

Sand and Gravel Program

Website: <http://www.mms.gov/sandandgravel/>

Earthquake Monitoring

Website: <http://www.consrv.ca.gov/cgs>

...common goal of safeguarding the delicate balance between water and land.

earthquake-induced ground motion are meager, at best. To gather data that may be used to strengthen the structures of offshore facilities in the event of a quake, MMS has installed a SEMS network off the coast of southern California.

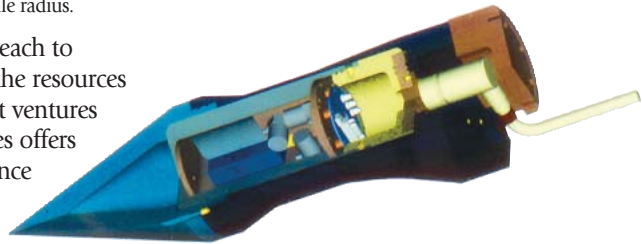
Under a Cooperative Agreement with the California Division of Mines and Geology (CDMG), the CDMG actively maintains and monitors the offshore network in addition to the State's land-based seismic probes located throughout California. The SEMS network can record earthquakes originating onshore and provides complementary real time data to information collected from the State's onshore seismic network. As a result, MMS and the State of California are working together to understand better the level of ground shaking to be expected as the result of movement on any one of California's onshore or offshore faults. Access to the data is available to researchers and other government agencies.

In an era of mandatory budgetary restraint, cooperation between State and



Above: The SEMS project consists of three seismic probes embedded into the seafloor and wired to computers on nearby platforms. Below: A probe can record a magnitude 4.0 earthquake within a 25-mile radius.

Federal agencies allows each to accomplish more with the resources available. Fostering joint ventures between MMS and States offers an opportunity to enhance the knowledge and capabilities of both.



LATEST DISCOVERIES

NATURAL GAS DISCOVERY IN THE EASTERN GULF OF MEXICO – SAN JACINTO PROSPECT



Dominion Exploration & Production, Inc. recently discovered natural gas at the San Jacinto prospect. The discovery is located in DeSoto Canyon Block 618, about 100 miles from Louisiana in the Eastern Gulf of Mexico. Dominion owns 53 percent of the prospect and is the operator. Spinnaker Exploration Company (27% working interest) and Kerr-McGee Corp. (20% working interest) are partners.

The San Jacinto prospect was drilled to a total measured depth of 15,829 feet using Transocean's *Deepwater Millennium* drillship (pictured at left, photo courtesy of Transocean) and encountered natural gas in multiple reservoir sands. The discovery is Dominion's second in the Eastern Gulf of Mexico area, only 6 miles from the recently announced Spiderman/Amazon discovery. Development alternatives for the Spiderman/Amazon discovery are under evaluation and will now include San Jacinto. Anadarko Petroleum Corporation is the operator of Spiderman/Amazon.

...future leaders and decision-makers need to be prepared...



Left: Kids learn how MMS biologists study marine animals and seabirds.

their environment is safe and habitable for all.

NEED teaches the complex scientific concepts of energy and provides objective information about energy sources, such as their use and impact on the

According to a random survey of 1,500 adults conducted in 2001 by Roper and the National Environmental Education and Training Foundation, only 12 percent of participants could pass a basic quiz on energy knowledge. For questions such as how most of our electricity is generated, whether average gas mileage is rising or falling, and what the fastest growing sector of the economy is with regard to energy consumption, a mere one in eight answered correctly. Yet, 75% of those surveyed rated themselves as knowing "a lot" or "a fair amount" about energy. The Minerals Management Service (MMS), America's ocean energy agency, has teamed up with the National Energy Education Development Project (NEED) to change these statistics. NEED's mission is to ensure that the next generation has a better basic understanding of energy and the many issues that must be addressed to ensure

environment, economy, and society. NEED makes it simple and fun to learn these concepts through hands-on exercises available for all grade levels, from kindergarten through high school. The science of energy (heat, light, motion, sound, nuclear, and electricity) is brought to life for young students through activities such as cooking in solar ovens and making their own



compasses. Students drill for oil in cupcakes, construct layered earths to understand geothermal resources, build windmills, and mine for coal in chocolate chip cookies. Older students learn how to calibrate thermometers, how to calculate the heat of vaporization, and why sidewalks have cracks.

"The MMS assists NEED in hosting regional teacher workshops throughout the country," says John Romero of the Pacific Region Public Affairs office, "and in developing new educational materials like OCEAN ENERGY (<http://www.mms.gov/mmskids/>), which explores America's current and potential ocean energy resources. The MMS shares its scientific and technical expertise with NEED to support the program's goal of providing teachers with science-based educational materials that encourage a basic understanding of energy sources, consumption, conservation, and stewardship."

The NEED Teacher Advisory Board of outstanding educators and Advisory Board of energy experts review all teaching materials for scientific accuracy, objectivity, and effectiveness, as well as educational soundness. Participants – including students, educators, sponsors, and partners – also evaluate the materials and training programs, as well as new activities, to ensure the materials are meeting the test of a comprehensive energy education.

As the challenges of providing energy supplies while increasing efficiency and energy conservation become increasingly complicated, future leaders and decision-makers need to be prepared to meet those challenges. NEED and MMS are helping train the next generation to meet that challenge.

FOR MORE INFORMATION:

Teacher's Aides from MMS

Website: <http://www.mms.gov/mmskids/>

The NEED Project

Website: <http://www.need.org/>

WORKING TOGETHER FOR A SAFER WORLD

The offshore oil and gas industry is an international industry with major companies operating in many countries. Each country has organizations in place to assess and ensure the use of sound technological developments and to protect the oceanic environment. Most countries have recognized that it is impossible for one country to be environmentally separate from another. Australia, Bangladesh, Canada, China, Georgia, India, Indonesia, Kazakhstan, Norway, Russia, Turkmenistan, and the United Kingdom are some of the countries that have joined with the Minerals Management Service (MMS) to share information and research safety operations and procedures that use the ocean's resources.

The National Energy Board (NEB) of Canada has a long-standing collaborative relationship with the MMS jointly to fund several research initiatives relating to safety and pollution prevention aspects of offshore oil and gas operations in each country. These projects have dealt with the integrity of marine pipelines and the assessment of human factors as to the safety of operations.

The MMS and NEB have been very active in sponsoring the International Committee on Regulatory Authority on Research and Development (ICRARD), which includes the representatives of the U.S., Canada, the U.K., Norway, the Netherlands, Brazil, Mexico, New Zealand, and Australia, to share information and to cooperate on research regarding the safety of offshore



(Left to Right) Norway's Director General, Petroleum Safety Authority, Magne Ognedal and United States MMS Director Johnnie Burton sign a memorandum of understanding at the Agency's headquarters in Washington, D.C. The two organizations will consult regularly on offshore safety issues to exchange information and share ideas, skills, and technologies. Pictured also are Tom Readinger, MMS Associate Director, Offshore Minerals Management, and Bud Danenberger, MMS Chief, Engineering & Operations Division. Photo by James Bennett, MMS.

operations. The two countries have jointly sponsored international workshops to share the latest technology and establish priorities for future research. Safety issues currently being jointly studied include pipeline integrity maintenance activities, development and evaluation of oil-spill chemical treating agents, such as dispersants, and the detection of spilled oil under ice using ground-penetrating radar and hydrocarbon gas "sniffer" technology.

In May 2004, MMS announced a renewed partnership with the Petroleum Safety Authority (PSA) of Norway to exchange information, ideas, and techniques related to offshore oil and gas operations. The PSA was established in 2004 (replacing the former Norwegian

Petroleum Directorate) and charged with the responsibility of ensuring safe oil and gas exploration and development.

Left: An MMS inspector on a platform. The MMS conducted over 24,000 inspections of offshore facilities during the year 2003.



International relationships such as these are important to MMS, the primary manager of our Nation's offshore resources. Management of ocean resources cannot be conducted in isolation. Decisions made by other governments or foreign developers concerning their own resources can have a profound effect on the health of the ecosystems off our own shores. Cooperative relationships with other countries create an important mechanism that provides MMS with another valuable tool for maintaining its goals and obligations as the manager of our Nation's offshore resources.

FOR MORE INFORMATION:

MMS International Activities Program

Website: <http://www.mms.gov/international/>

Research with Canada

Website: <http://www.mms.gov/tarinternational/canada.htm>

Agreement with Norway

Website: <http://www.mms.gov/3039.htm>

Securing Ocean Energy and Economic Value for America



Spar production platform in the Marco Polo field located 150 miles off the Louisiana Coast in 4,300 feet of water depth.

Photo Courtesy of Anadarko Petroleum.

NEW WAVES Late-breaking News & Information

MMS Summer ... We're All Wet!

This is a busy summer for MMS field work! From the Atlantic coast through the Gulf of Mexico, off southern California, and to the Arctic, MMS will have ocean scientists researching everything from the behavior of sperm whales to the biological communities associated with offshore platforms!

In the Gulf, seagoing research involves a fleet of research vessels, remotely operated vehicles or ROV's, divers, and even a manned submersible! Work is continuing on our world renowned Sperm Whales & Seismic Surveys study, or SWSS. New efforts in the Gulf will include studies of the deep-sea coral *Lophelia*. The MMS is funding two *Johnson Sea Link* submersible expeditions to begin looking at numerous deep coral reef sites in the Gulf of Mexico (1,500+ feet). Scientists have only recently begun to study deep coral reefs in the Gulf. Other new studies include an evaluation of how WW II shipwrecks act as artificial reefs in the Gulf in areas as deep as 6,000 feet. The MMS divers will also participate in a

monitoring cruise to Flower Garden Banks National Marine Sanctuary. These pristine coral reefs 118 miles off the Texas and Louisiana coast are surrounded by active oil and gas operations and have maintained an extraordinarily healthy live coral cover since study began there more than 30 years ago.

The Pacific OCS Region will be documenting fish assemblages along the Point Arguello pipelines off Point Conception, and diving on natural tar seeps to collect samples for fingerprinting in the same area. The MINT team also plans to test rocky intertidal protocols that would be used to document shoreline species within the first 24 hours of an oil spill response.

In Alaska, MMS will initiate the continuation of the Arctic Nearshore Impact Monitoring in Development Area (ANIMIDA) in the vicinity of the Northstar development, offshore Prudhoe Bay, and the Liberty Area. Acoustic Doppler Current Profilers will be deployed along the U.S. Beaufort Sea coast to characterize year round currents and especially currents located below the ice.

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