

Offshore Environmental Studies Program

**Fiscal Years 2008–2010
Studies Development Plan**

Headquarters, *Leadership & Guidance*

**U.S. Department of the Interior
Minerals Management Service
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TABLE OF CONTENTS

SECTION 1.0	PROGRAMMATIC OVERVIEW	1
1.1	Introduction	1
1.2	Headquarters Research Components and National Oversight	3
1.2.1	General Program Support and Quality Assurance	3
1.2.2	General Peer Review Planning	3
1.2.3	Information Management and Dissemination	4
1.2.4	Physical Sciences and Oil Spill Risk Analysis	4
1.2.5	OCS Renewable Energy and Alternative Use	5
1.2.6	Hydrates	5
1.2.7	U.S. Ocean Action Plan	5
1.2.8	International Polar Year and Global Climate Research	9
SECTION 2.0	TOPICAL AREAS	11
2.1	Physical Oceanography	11
2.2	OCS Renewable Energy and Alternative Use	11
2.3	Social Sciences	11

SECTION 1.0 PROGRAMMATIC OVERVIEW

1.1 Introduction

The Minerals Management Service (MMS) serves as the steward for America's offshore energy and mineral resources on the Outer Continental Shelf (OCS) and is one of the top revenue collectors for the United States. MMS manages activities that generate 30 percent of America's domestic oil production, 21 percent of America's domestic natural gas production, and now provide, on average, over \$8 billion in annual revenues for the Nation, States, and American Indians. The Federal OCS is a major supplier of oil and natural gas for the domestic market, contributing more to the total U.S. oil and natural gas supply than any single state or country in the world.

Over the next five years, OCS production could account for more than 40 percent of U.S. oil production and 23 percent of U.S. natural gas production, mostly due to new discoveries in deepwater and at greater depths beneath the ocean floor. The OCS will continue to be a critical source of future supplies. It is estimated that the OCS contains more than 60 percent of the Nation's remaining undiscovered oil and as much as half of our country's undiscovered recoverable natural gas.

As established oil- and gas-producing areas mature, America's energy industry is pushing into new frontiers (both in the Gulf of Mexico and in Alaska waters) in its search for hydrocarbon resources. This advance is critical to meeting the Nation's energy needs through production of domestic resources; but it also poses new risks in terms of the high reservoir pressures and temperatures faced during deep drilling operations, the cross-currents that affect deepwater operations, and the logistical challenges of operating in the Arctic environment. Additionally, the passage of the Energy Policy Act of 2005 gave MMS new responsibilities in not only new frontier "areas" but also in frontier "technologies."

The MMS planning process links MMS activities to the Department of the Interior's Strategic Plan in two major mission component areas: Resource Use and Serving Communities. Careful planning ensures that goals and strategies are cascaded throughout the organization.

The major offshore program objectives linked to the Department's Strategic Plan include: Energy Access and Development, Responsible Use, Safety, Non-Energy/Alternative Use, Management, Improved Assessment and Information for Decisions, and Optimal Value. Within MMS Offshore Minerals Management (OMM), strategies guide development of budget documents and are used as input for planning and performance documents in support of ongoing efforts to build a Department-wide strategic plan.

OMM's ongoing work to oversee offshore energy and marine mineral exploration and development on the OCS, from lease offerings to lease abandonment, also addresses our multiple mandates to conserve our natural resources, provide energy for the Nation, protect people and marine life, and ensure a fair return for development of OCS minerals. This work includes ongoing critical research on the environment and safety-related technologies, and preparation of rigorous environmental assessments for proposed mineral development

activities. The environmental research component is conducted through the Environmental Studies Program (ESP).

The ESP was initiated in 1973 as a means to gather and synthesize environmental and social and economic science information to support decision-making concerning the offshore oil and gas program. The Outer Continental Shelf Lands Act of 1953, (OCSLA), as amended in 1978, established policy for the management of the OCS oil and gas leasing program and for the protection of marine and coastal environments. Section 20 of the Act authorizes the ESP and establishes three general goals for the program:

- Establish the information needed for assessment and management of environmental impacts on the human, marine, and coastal environments of the OCS and the potentially affected coastal areas;
- Predict impacts on the marine biota which may result from chronic, low level pollution or large spills associated with OCS production, from drilling fluids and cuttings discharges, pipeline emplacement, or onshore facilities; and,
- Monitor human, marine, and coastal environments to provide time series and data trend information for identification of significant changes in the quality and productivity of these environments, and to identify the causes of these changes.

Early ESP efforts summarized and synthesized available information and early field studies were designed to provide a statistically valid baseline of the biological, geological, chemical, and physical characteristics of proposed leasing areas. Over the years many changes have occurred. Leasing and development activities are now focused predominantly in the Gulf of Mexico (GOM), with recent development and promising leasing activity in Alaska's Beaufort and Chukchi Seas and new leasing in the North Aleutian Basin, and some production in southern California. Studies conducted in these areas are focused on characterizing environmental processes to address critical OCS information needs. In addition, the ESP has expanded its purview in selected areas to include environmental issues associated with marine mineral recovery (i.e., sand and gravel) and naturally occurring gas hydrates.

The ESP Headquarters component of this Studies Development Plan (SDP) provides the national "context" of the Program and the linkages between MMS' diverse Regional needs. . In contrast to the Plans prepared by our Regional Offices that focus on specific geographic areas, the Headquarters Office SDP emphasizes issues (and sometimes specific studies) which are more national in scope with program-wide application. ESP Headquarters provides leadership and general program support (quality assurance, information and data management and dissemination), integration of MMS' physical oceanography studies to support oil spill risk assessment (OSRA); and, most recently issues pertaining to renewable energy alternatives, and hydrates.

1.2 Headquarters Research Components and National Oversight

1.2.1 General Program Support and Quality Assurance

Annual support for the activities of the OCS Scientific Committee will continue to be provided as a Headquarters Office function. The Scientific Committee was established to advise the Director of MMS on the feasibility, appropriateness, and scientific value of the ESP.

In recognition of the benefits of peer-review and to enhance dissemination of environmental information as widely as possible, the MMS routinely provides support to scientific conferences and symposia. In some cases, symposia may have a dedicated session on OCS research; in other cases, OCS-sponsored research may be presented within the context of a wider scientific discipline.

Another area of program support sponsored by the Headquarters office has been the archiving of biological specimens. The ESP supports such a program with the Smithsonian Institution, U.S. National Museum as the curator through the Biological Resources Discipline (BRD) within the U.S. Geological Survey. This project will be recommended by MMS as a priority for BRD to continue funding in FY 2007 and beyond.

More recently, there has been more national attention directed towards performance measures and accountability. During the FY 2004 budget cycle, the ESP underwent a program review by the Office of Management and Budget (OMB). Through the use of the OMB's Program Assessment Rating Tool (PART) the ESP received one of the highest scores in government. We are proud of this achievement but there is always room for improvement. To this end, working with guidance provided by OMB, we designed and implemented the Environmental Studies Program Performance Assessment Tool (*ESP-PAT*), an internal, online system to monitor the effectiveness of ESP products in fulfilling the Bureau's information needs. While designing performance measures for research programs has always been viewed as problematic, at best, the *ESP-PAT* has accomplished this task ensuring that the ESP fulfills its mission of providing the best possible scientific information for making decisions concerning our offshore resources.

1.2.2 General Peer Review Planning

Section V of OMB's Final Information Quality Bulletin for Peer Review requires that agencies "begin a systematic process of peer review planning" and publish a "web-accessible listing of forthcoming influential scientific disseminations (i.e., an agenda) that is regularly updated by the agency."

Numerous mechanisms that have been in place in the ESP identify and fulfill the requirement for scientific peer review. These existing mechanisms include:

- External review of proposals
- Review and critical input by Scientific Review Boards or Modeling Review Boards

- Review and critical input by scientific advisory committees under the Federal Advisory Committee Act
- Scientific peer review of final reports, and/or
- Publication in peer-reviewed technical and/or scientific journals

These measures begin early in the development stages, and continue during the course of projects. In addition, projects are regularly presented at MMS Information Transfer Meetings and special workshops facilitating both scientific peer-review and public/stakeholder input.

1.2.3 Information Management and Dissemination

While the goal of the ESP is “to gather and synthesize environmental and social and economic science information to support decision-making concerning the offshore program” the information must be available in a usable form and in a timely manner.

Rapid information dissemination is a key information management activity. The Environmental Studies Program Information System (ESPIS) has been designed to allow for easy access to ESP products. Full-text files, abstracts, and relational databases are searchable by the system. This allows users to easily search, identify, and select sections of text, or bibliographic citations that relate directly to the desired subject. This system makes the ESP contracted research information directly available to the public and is available through the Internet at www.gomr.mms.gov/homepg/espis/espisfront.asp.

Information concerning ongoing research supported through the ESP is accessible at www.mms.gov/eppd/sciences/esp/profiles/index.htm. The web design is arranged by MMS OCS Region and discipline (e.g., biology, socioeconomics, physical oceanography, modeling, etc.). Information available for each study includes a complete description, status report, cost, and expected date of its final report. Affiliated web sites and presentation abstracts and papers are provided where applicable.

1.2.4 Physical Sciences and Oil Spill Risk Analysis

The Headquarters Office role in coordinating with regional physical oceanographic studies focus on understanding and verifying general physical processes and features common to the OCS. The mechanisms of these processes and features in the ocean and atmosphere control the transport of materials and cause the mixing and redistribution of pollutants. The knowledge and information obtained from the physical oceanography and meteorology studies are used in assessing: 1) the transport of spilled oil, 2) the dispersion of discharge fluids and produced water, 3) the movement and spread of air pollutants, and 4) the effects on the migration of marine mammals, the distribution of fishes, and other biological resources.

The MMS is committed to the continuous improvement of its Oil Spill Risk Analysis (OSRA) estimations, and is using the results of field and modeling studies of ocean circulation to fulfill that commitment. The fate of spilled oil is another area of focus. Laboratory analysis is conducted on the various types of oil as well as computer modeling of the behavior of an oil

spill in the ocean environment. Furthermore, the ESB staff actively seek cooperative efforts with other agencies and private industries in such matters. These efforts leverage MMS's resources, while providing additional needed information and external review.

1.2.5 OCS Renewable Energy and Alternative Use

MMS faces a wide range of new and expanded responsibilities, with immediate and long-term implications, as a result of the enactment of the Energy Policy Act of 2005. Provisions of the Act place significant demands on the resources of the Minerals Management Service, affecting existing programs as well as authorizing the establishment of a comprehensive OCS Alternative Energy and Alternative Use Program. MMS will assume permitting authority for offshore renewable energy projects (wind, current, wave, solar, etc.). Renewable energies are expected to be a fast growing industry, and little is known at this time about engineering standards and environmental impacts.

1.2.6 Hydrates

In the past few years, there has been increasing interest in the recovery of gas hydrates from the OCS as a new energy source. Exploration into the location and distribution of gas hydrates along the continental slope of the Gulf of Mexico is presently underway through federal government and industry partnerships. Within the next five-to-ten years, this could lead to the possible commercial extraction of hydrates. At the national level, the Environmental Studies Program is exploring opportunities to collaborate with other agencies and industry in hydrate research projects that contribute to our knowledge of the marine environment that could be affected by the development activity. This approach will allow us to achieve a highly leveraged investment for our limited research dollars. Complementary to collaborations at the national level, the Regions will develop local area-specific environmental studies to meet the information needs of resource managers in the region. Our vision will support MMS mission and long-term goals and the Department's goals focusing on environmentally-sound development of our nation's natural resources.

1.2.7 U.S. Ocean Action Plan

The U.S. Ocean Action Plan (USOAP) was released in December 2004 in response to the U.S. Commission on Ocean Policy. The Plan emphasized six fundamental actions:

- Enhancing ocean leadership and coordination
- Advancing our understanding of oceans, coasts, and Great Lakes
- Enhancing the use and conservation of our ocean, coastal and Great Lakes resources
- Managing coasts and their watersheds
- Supporting maritime transportation, and
- Advancing international ocean science and policy.

The ESP is already utilizing its talent and experience in conducting mission oriented research focused on the sound management of ocean resources as mandated in the USOAP. Following

a detailed review of “where it can contribute” the ESP is striving to contribute specifically to the first three action areas above, as described in the following sections.

- *Enhancing ocean leadership and coordination*

The ESP has been actively engaged in coordinating our efforts with such programs as the National Oceanographic Partnership Program (NOPP) and Ocean.US, the national office for ocean observations, but is now also actively engaged in the new national ocean governance structure established by the USOAP. For example, MMS is a member of the Joint Subcommittee on Ocean Science and Technology (JSOST), the Subcommittee on Integrated Management of Ocean Resources (SIMOR), and the subsidiary bodies thereof. MMS scientists and staff were intimately involved in the development of a national Ocean Research Priorities Plan and Implementation Strategy as called for in the USOAP and released January 26, 2007; working to ensure that individuals with expertise in OCS resources and research are considered for membership in the newly chartered Ocean Research and Resources Advisory Panel; working on a SIMOR team addressing issues of ocean governance; and co-chairing the JSOST Interagency Working Group on Ocean Partnering. These and other ongoing activities reflect our commitment to integrated planning and coordinated efforts to ensure good ocean governance.

As a charter member of NOPP the ESP continues to explore options to increase its participation. Our NOPP investments have grown dramatically since 2002 and notably with the success in FY 2004 with the MMS Alaska OCS Region leading the effort to support a NOPP-approved pilot project supporting the national effort to develop an ocean observing system. Our efforts continued in FY 2005 through NOPP collaborative efforts with NOAA to initiate a multi-year deep ocean exploration study of chemosynthetic communities in the Gulf of Mexico. Since 2006, MMS has been involved in the review, and potential funding support, of proposals received under a NOPP solicitation with the themes of an *Ice Free Arctic* and *Marine Mammals*.

- *Advancing our understanding of the oceans*

The USOAP highlights the Administration’s support for an integrated ocean observing system (IOOS). IOOS activities at the national level are now coordinated by the JSOST Interagency Working Group on Ocean Observation (IWG-OO) which oversees Ocean.US, the national office for ocean observations. MMS is a member of IWG-OO and its predecessor, the Ocean.US Executive Committee. As a developer, user, and contributor to IOOS, MMS is involved at both the National and Regional level. In FY 2004 we initiated an IOOS "Pilot Project" in Alaska studying the application of high frequency radar for current mapping. In addition, the USOAP specifically recognized an MMS-Industry initiative to establish a deepwater ocean current monitoring system in the Gulf of Mexico; an example of government-industry cooperation in support of IOOS.

In November 2004 the MMS issued a Notice to Lessees and Operators (NTL) to establish and implement an ocean current monitoring and data sharing program in the Gulf of Mexico.

As suggested by Admiral James D. Watkins, Chair, U.S. Commission on Ocean Policy, the nation should use ocean exploration as a means to stimulate education. To this end, MMS was the first NOPP agency to successfully link discrete program needs with exploration and education. In FY 2004 through NOPP and with NOAA's Office of Ocean Exploration (OE) as a partner, MMS awarded the study *The Archaeological and Biological Analysis of World War II Shipwrecks in the Gulf of Mexico: A Pilot Study of the Artificial Reef Effect in Deepwater*. This recently completed study (MMS 2007-015) is the recipient of the 2007 NOPP *Excellence in Partnering Award*.

In FY 2005 we developed another major collaborative study with the NOAA-OE to investigate chemosynthetic communities on the lower continental slope of the Gulf of Mexico. In these cooperative efforts, MMS acquires the information it needs in frontier areas by utilizing the expertise and state-of-the-art exploration capabilities of its NOPP partner. In these efforts MMS provides the funding for the science and NOAA-OE provides support for ship time including a manned submersible and deep sea capable ROV's and AUV's.

For 2007/2008, MMS, NOAA-OE, and the USGS are working under the NOPP banner on a potential second phase of our deep sea coral research that is nearing completion. This new study which will not only extend the depth and geographic range of our observations, but also incorporate new questions raised pertaining to a deep artificial reef effect during our award winning study *The Archaeological and Biological Analysis of World War II Shipwrecks in the Gulf of Mexico: A Pilot Study of the Artificial Reef Effect in Deepwater*.

The Ocean Commission has stressed that "it is imperative that the nation fosters an ocean-literate society that is equipped to deal with existing and impending issues and which is able to make choices and influence decisions based on knowledge." MMS ESP education efforts focus on our area of expertise -- the

The Administration supports promoting ocean literacy and ocean education. Successful ocean stewardship and conservation depend on informed policy-makers and an informed public.

ocean and ocean energy. We encourage the inclusion of an educational component into studies at the design stage. We also use research results to prepare information for classroom use. This information is distributed through our website, in response to direct requests, and through our participation at the national conferences of science teachers and marine educators. We will continue to look for new ways to disseminate ESP information and explore opportunities to get it into the classroom.

We are also working through our Coastal Marine Institute's to develop ways in which our research can *include* educational components and we are exploring processes whereby ESP-sponsored projects can include Optional Tasks to produce "educational" materials using a process similar to that used by NOPP.

- *Enhancing the use and conservation of our oceans*

The USOAP recognized MMS leadership in the multi-year multi-million dollar survey of deep sea corals in the Gulf of Mexico that involves the use of a manned submersible to survey and sample the deep ocean environment. Based on the survey data, DOI took action to conserve known deep sea coral communities that were located during surveys conducted by MMS.

Promote Coral Reef and Deep Coral Conservation and Education

Coral reefs, and their associated systems of mangroves and seagrasses are the world's most biologically diverse marine ecosystems... Deep sea corals are related, but distinct from tropical coral reefs, and are generally found in cooler waters.

We continue our efforts to integrate ecosystem management into the studies planning process. Generally speaking, MMS has a good track record in this arena. Looking back, early ESP planning in the Gulf of Mexico Region, for example, was generally ecosystem based. The coastal habitats were studied via Fish & Wildlife Service's "coastal characterization" studies that were ecologically defined, and each included a standard suite of reports: habitat descriptions, species profiles, socioeconomic, mapping and GIS information, etc. The marine study areas reflected physiographic units that were either generally distinct, with boundaries where habitats changed (e.g., South Texas Shelf, Texas-Louisiana Shelf, Miss-Ala Shelf, West Florida Shelf, SW Florida Shelf) or were special habitats (Topographic Features, Deepwater). For each of these areas a standard suite of studies was planned: baseline or benchmark studies (later, "marine ecosystem studies") including some marine ecosystem modeling, to better understand marine ecosystem processes and to clarify information needs for subsequent studies. Later studies efforts included marine ecosystem modeling work and highly integrated interdisciplinary studies which continue today.

During FY 2005, a characterization of the Gulf of Mexico deep-sea soft bottom ecosystem was completed through the MMS study *Deepwater Program: Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology*. This large ecosystem-based synthesis is the final product of a program designed to provide a better understanding of variations in the structure and function of animal assemblages in relation to water depth, geographic location, time, and overlying water mass. Biological data are integrated with measurements of physical and chemical hydrographic parameters, sediment geochemical properties, and geological characteristics that are known to influence benthic community distributions and dynamics. This synthesis provides the broad view of the deep GOM soft bottom benthic ecosystem in depths from 300 meters to 3700 meters. It incorporates new information collected through a cooperative effort with Mexico from the greatest depths of the GOM in Mexican waters. The MMS also has sponsored studies of other components of the GOM deep-sea ecosystem such as the highly specialized chemosynthetic communities associated with natural hydrocarbon

...we will employ the best science and data to inform our decision-making. The Administration will continue to work towards an ecosystem-based approach in making decisions related to water, land, and resource management...

seeps and hard substrate communities including *Lophelia* coral. The MMS is planning an overall ecosystem-based synthesis incorporating all components of the GOM benthic environment when results from these ongoing projects are available.

1.2.8 International Polar Year and Global Climate Research

The Department of the Interior Office of the Secretary has emphasized the importance of the International Polar Year (IPY) and global climate research with the establishment of several Interior-wide coordinating committees and task forces. Global climate change may impact Interior lands and regulatory responsibilities in untold ways and the MMS Environmental Studies Program will contribute critically needed science for direct application to resource management activities to accomplish the MMS goal to safely develop energy and mineral resources on the OCS.

IPY activities will focus international research and the attention of the public on the role that polar regions play in global climate processes. MMS research planning activities for FY 2007 – 2009 include collaboration with the National Oceanographic Partnership Program, individual agencies and research scientists to incorporate IPY components when feasible. MMS arctic research plans include studies of several species of marine mammals which inhabit sea-ice habitats, and marine birds and their ecosystems, arctic mesoscale meteorology, river plume transport processes, ocean circulation, sea-ice modeling and potential collaboration with the developing arctic component of the Integrated Ocean Observing System (IOOS).

SECTION 2.0 TOPICAL AREAS

This section describes program activities and emerging issues and concerns that are likely to lead to information needs and research in FY 2010 and beyond.

2.1 Physical Oceanography

Future physical oceanographic studies are expected to be directed towards improving the oil spill risk analysis process by incorporating and assimilating observational data into the risk assessment methods and by improving ocean circulation current modeling. The ESP will continue to support programs that provide a better understanding of transporting spilled oil and other materials by ocean currents via simulation modeling and surface drifter observations. The ESP will also continue to develop integrated programs among physical, biological and chemical oceanography disciplines. Areas of study will include the western, central, and eastern Gulf of Mexico; the Santa Maria Basin/Santa Barbara Channel, California; near-shore Beaufort and Chukchi Seas, Cook Inlet, and now the North Aleutian Basin Alaska; and possibly areas off of the east coast, specifically the north and mid-Atlantic Areas.

2.2 OCS Renewable Energy and Alternative Use

The geographic range represented for the new activities for this program could include all coastal areas. Many energy projects are expected on the east coast, where the MMS Environmental Studies Program has not operated for many years. Some existing information may be out of date, and entirely new scientific techniques or discoveries demand new data collection and analysis. Studies have been undertaken to address immediate information needs for a proposed wind energy project and future efforts will be developed based on syntheses of information and assessments of proposed technologies. Future studies will incorporate elements of literature reviews and information syntheses, workshops, modeling, field observations, and environmental monitoring.

2.3 Social Sciences

The complexity of the oil and gas industry continues to be an important issue. How the industry functions as an organizational system and affects social structure continues to be documented in order to understand the social effects it may have on employees, their families, and the communities that are tied to or in proximity to oil and gas development. Closing the gaps and making the connections between industry actions and effects on human communities will enable MMS to look across localities, regions, and nations, and observe impacts. To do this, several types of information are needed. Below are some steps that should be considered.

- The United States is one of the few developed nations that does not keep a labor force demography (because there are no requirements to do so). Considering the magnitude of the contractor workforce and the global nature of the industry, information on the

number of offshore workers and the demographic breakdown of the workforce (i.e., women, minorities, etc.) should be available.

- The “best practices” of industry need to be documented and compared across national boundaries.
- Communities are affected by offshore development depending on how and if they have historically evolved with industry. In times of change, communities may need to diversify their economic base. Thus, options for community development and their capacity for change need to be understood.
- In the past, research has documented similar effects on communities from OCS activities across nations. More comparative studies among developed and undeveloped countries would certainly prove valuable.
- In the past, research workshops have been valuable sources of information collection and dissemination. These types of communication should continue to be encouraged.

Finally, labor mobility, shortages, and employee loyalty are questions of concern to the oil and gas industry. Because the industry is global, having no national boundaries, issues such as downturns, employee shortage, loyalty, and community impacts can exist no matter where the industry operates.