

Offshore Environmental Studies Program

**Fiscal Years 2008-2010
Studies Development Plan
Gulf of Mexico OCS Region**

**U.S. Department of the Interior
Mineral Management Service
Gulf of Mexico OCS Region
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ACRONYMS

BLM	Bureau of Land Management
BNWA	Breton National Wilderness Area
BRD	Biological Resources Division
CMI	Coastal Marine Institute
DARE II	Deepwater Artificial Reef Effect II
DOE	Department of Energy
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESP	Environmental Studies Program
FGBNMS	Flower Garden Banks National Marine Sanctuary
G&G	geological and geophysical
GOM	Gulf of Mexico
GOMR	Gulf of Mexico Region
JIP	joint industry project
LE	Leasing and Environment Office
LC	Loop Current
LSU	Louisiana State University
MAFLA	Mississippi, Alabama, and Florida
MAMES	Mississippi-Alabama Marine Ecosystem
MMPA	Marine Mammal Protection Act of 1972
MMS	Minerals Management Service
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOPP	National Oceanographic Partnership Program
NRC	National Research Council
NTL	Notice to Lessees and Operators
OCS	Outer Continental Shelf
PI	principle investigator
PSFB	Potentially Sensitive Biological Features
ROV	remotely operated vehicle
SAC	Scientific Advisory Committee
SIA	social impact assessment
SWSS	Sperm Whale Seismic Study
USGS	U.S. Geological Survey

SECTION 1 PROGRAMMATIC OVERVIEW

1.1 Introduction to the Region

In managing Outer Continental Shelf (OCS) activity, the Minerals Management Service (MMS) has two core responsibilities, safe offshore operations and environmental protection. Our safety goal is to ensure incident free minerals exploration and development on Federal offshore leases. Our environmental responsibilities are to ensure that all activities on the OCS are conducted with appropriate environmental protection and impact mitigation.

The MMS New Orleans Regional Office conducts all leasing and resource management functions on the OCS for the Gulf of Mexico Region (GOMR) and the Atlantic Region OCS areas, a total of 415 million acres in seven planning areas (see map in Section 1.2). The GOMR OCS has three planning areas along the Gulf Coast contain 43 million acres under lease (as of 03-31-2006). There are approximately 4,000 structures in the Gulf. Of those 4,000 structures, only approximately 1,200 are production platforms active in the search for natural gas and oil on the Gulf OCS (as of 04-03-2006); these contribute significantly to the Nation's energy supply.

The MMS Environmental Studies Program (ESP) was established in 1973 as a means to gather information to support decisionmaking for offshore oil and gas leasing. The program (then under the Bureau of Land Management (BLM)) evolved with changes in the geographic areas of concern, in environmental issues, and in study priorities and policies. In 1994, the MMS Atlantic OCS Regional Office was closed and its responsibilities transferred to the GOMR. In the GOMR, the ESP addresses issues from prelease through postlease operations. In the Atlantic Region, the ESP has been limited to prelease descriptive and process-type investigations since there has been no production in that area.

The Gulf of Mexico (GOM) is anticipated to remain the Nation's primary offshore source of oil and gas. Initiatives to emphasize the use of "environmentally friendly" natural gas further promote the production from the Gulf's gas fields. Advances in offshore technologies (e.g., directional drilling; deepwater structures such as sub-sea completions, spar, and tension-leg platforms; sub-salt prospecting; three-dimensional geophysical profiling; and down-hole instrumentation) ensure that exploration and development will continue in the Gulf for decades to come.

In 1992 the MMS entered into a partnership with the Louisiana State University (LSU) to establish the first Coastal Marine Institute (CMI). This partnership was developed as part of an initiative to cultivate new State-Federal cooperative agreements on environmental and socioeconomic issues of mutual concern. These projects are designed to help answer questions regarding the potential impacts from oil and gas and marine minerals activities.

The establishment of the Biological Resources Division (BRD), a division of the U.S. Geological Survey (USGS), in 1996, provided the MMS with new opportunities for partnership in biological research. The BRD has procured and is conducting several studies

for the GOMR. This partnership will continue and several projects are described in this plan anticipating the involvement of the BRD.

Because there has been a dramatic increase in deepwater oil and gas activity in the GOM, the MMS sponsored a deepwater workshop in April 1997. Conducted under a cooperative agreement with LSU, the workshop focused on physical oceanography and the environmental and sociological sciences. The recommendations and issues identified in the workshop proceedings (Carney, 1997) are being used to design the studies needed by the MMS in the preparation of environmental assessments (EA), other National Environmental Policy Act (NEPA) documents, and deepwater regulations to oversee oil and gas activities. A follow-up workshop to discuss the results of these studies was held in May of 2002 (Schroeder and Wood, 2003). The information gathered since the first workshop was presented. Since most of the studies are still ongoing, it was determined that any planning for follow-up studies wait until the results and recommendations of the ongoing studies are available.

1.2 Map of the Planning Area



Figure 1. Map of the Planning Area

1.3 Projected OCS Activities

1.3.1 Gulf of Mexico Region

Since the GOMR is the most active OCS area, all activities associated with oil and gas exploration and production in U.S. are occurring here. These activities include leasing, exploration, development, removal of platforms, and laying of pipelines. The five-year

(2002—2007) environmental impact statement includes one lease sale per year in each of the central and western planning areas. The first lease sale in the eastern planning area since 1988 was held in December 2001. Two additional eastern planning area lease sales were proposed in the same area as Lease Sale 181. One was held in December 2003 and the second was held in December 2005.

Continuing the major expansion of the oil and gas industry in deepwater GOM, there were 10 new deepwater well startups and 12 new deepwater discoveries in 2006. By the end of 2006, there were 122 deepwater hydrocarbon production projects on line. More than 1,080 exploration wells have been drilled in the deepwater Gulf since 1995. At least 138 deepwater discoveries have been announced since then. In the next two years several very large developments are scheduled to begin production, including Thunderhorse, Atlantis, and Tahiti.

1.3.2 Atlantic Region

The last lease sale within the Atlantic Region occurred in 1983. On November 17, 2000, the interests in the last remaining eight natural gas and oil leases active in the Federal waters offshore North Carolina were relinquished. There are now no oil and gas leases in existence off the Atlantic Coast.

1.4 Identification of Information Needs

With the dramatic increase in offshore oil and gas activities in the deepwater of the GOM, environmental and socioeconomic information needs have increased as well. The GOMR has approximately 100 ongoing studies divided among all areas of interest. We are proposing studies in the following topics to meet our information needs to aid in future analysis within environmental impact statements (EIS's), EA's, mitigations, and other requirements from the NEPA.

1.4.1 Physical Oceanography

The Region has already conducted numerous studies along the continental shelf. We held a workshop in September 2000 to plan the acquisition of information in deepwater. The "Exploratory Study of Deepwater Currents in the Gulf of Mexico" examined current structures in the central Gulf. A second study is underway in the western Gulf and a third in the eastern Gulf. Results from these studies will be used to plan future research. An initial study to conduct process modeling using these data is proposed for FY 2008. We are also considering a workshop to be held shortly after data collection is complete.

Physical oceanographic processes do not stop at the Exclusive Economic Zone (EEZ) and a full understanding requires inclusion of information from Mexican waters. We are working with Mexican researchers to collect information in Mexican waters. One current meter mooring is presently deployed in the central Gulf and a second set of moorings is deployed in the western Gulf. A workshop with the Mexicans will be conducted in June of this year to discuss opportunities for future joint studies.

1.4.2 Atmospheric Sciences

MMS has completed two air emissions inventory studies: one for the Breton Sound area and one for the entire Gulf. A 2005 repeat of the Gulfwide emissions inventory is almost complete, which was to coincide with data collection activities by the Environmental Protection Agency (EPA) and state agencies. However, due to the impacts of the hurricanes in the Gulf in 2005, another Gulfwide emissions inventory effort will be performed for calendar year 2008. Another ongoing study uses modeling to assess the SO₂ and NO_x increments in the Breton National Wilderness Area (BNWA). Because modeled concentrations must remain within the increments, the SO₂ and NO₂ increment consumption can alter MMS OCS regulatory policies. Recently, MMS awarded a new study which will synthesize and integrate all meteorology, air quality, and emissions inventory data from MMS' past studies and any oil and gas industry related studies accomplished in the Gulf since 1988. This new database will allow analysis to determine the important relationships between the meteorological, air quality, and emissions variables for coastal areas and the BNWA. MMS has another ongoing study which will generate 5-year meteorological datasets for operators and MMS' use in OCD and CALPUFF impacts modeling. MMS is also proposing a study to determine if the data collected from the NASA Aura Satellite data can improve air quality modeling for potential OCS impacts to adjacent land areas in the GOM. The data provides vertical profiles of ozone and its photochemical precursors for the GOM.

In the next couple of years, it is probable that EPA will lower the 8-hour ozone standard from the current 85ppb to between 60 and 80ppb. Should this change occur, additional Gulf Coast counties/parishes would become non-attainment for ozone, which would likely generate renewed interest in OCS sources to mitigate OCS ozone contribution to these areas. In turn, this would require MMS to conduct additional air quality studies to accurately determine the OCS contribution.

1.4.3 Fates and Effects

The findings of the study "Effects of Oil and Gas Exploration and Development at Selected Continental Slope Sites in the Gulf of Mexico" was published in 2006. This study presented before- and after-exploration or development drilling results for four slope sites. The study "Synthetic-based Fluid Spill of Opportunity: Environmental Impact and Recovery" was awarded in November 2006. When an appropriate spill occurs in the future, the contract in place now will fund the study of the initial environmental impact. If successful, a follow-on study of the temporal changes related to site recovery from the SBF spill will be proposed. In the mid-1970's, the first major offshore environmental survey in the Gulf of Mexico was conducted in response to questions about the effects of oil and gas activities on the continental shelf. This study, Mississippi, Alabama, and Florida (MAFLA) examined physical, chemical, and biological parameters along the MAFLA shelf. Portions of the study area were revisited in the late 1980's for similar analyses as part of Mississippi-Alabama Marine Ecosystem (MAMES).

1.4.4 Biology

The final report for a major study of deep-sea benthic communities is nearing completion and will present exceptional information about the trends and distribution of benthic fauna in the deep Gulf. Data from this study will contribute to the understanding of density and types of organisms that live on the continental slope. The study also examined some of the processes that control the distribution of animals in the deep sea. Results from this study will be published in mid 2007 and should give new insights into future directions for deep-sea benthic research.

Chemosynthetic communities have been studied extensively at depths less than 1,000 m. Little was known about the extent of these communities at greater depths. A new study is underway that began in 2006 in coordination with the National Oceanic and Atmospheric Administration's (NOAA's) Ocean Exploration Program that is investigating the distribution of both deep chemosynthetic communities and other hard-bottom communities including deepwater corals at water depths below 1,000 m. The research submersible *Alvin* was used in 2006 to explore some known and many newly discovered biological communities on the lower continental slope of the Gulf. In 2007, an expedition is scheduled for a full month of study and exploration of deep slope communities using the remotely operated vehicle (ROV) *Jason* from Woods Hole Oceanographic Institution.

Expansive deepwater coral habitats have only recently been discovered and studied throughout the world as well as in the GOM. A study of deepwater coral in the Gulf was initiated by MMS in 2003. The results from this study, also using a research submersible, will be published in 2007. Discoveries of this effort have led to a better understanding of deep coral distribution and new research directions for understanding this significant deepwater community type. Development of a new study to further explore corals and other deepwater hard-bottom communities on natural as well as artificial substrates is underway with anticipated award in 2008.

We continue to jointly fund an annual monitoring project of the Flower Gardens Banks with NOAA through the National Marine Sanctuary program.

1.4.5 Protected Species

Since the meeting between the Scientific Advisory Committee (SAC) and Sperm Whale Seismic Study (SWSS) principle investigations (PI's) during the 23rd MMS Information Transfer Meeting, many of the recommendations by the SAC had been implemented. In particular, SWSS was extended for two more years to allow for an extra field season and for more time for collaboration. In 2005, SWSS completed its final field season and investigators are undergoing a year of analysis, synthesis, and integration leading to a final report and peer-reviewed publications. In June 2005, the geological and geophysical (G&G) petition package was completed and submitted to National Marine Fisheries Service (NMFS). NMFS has secured funding and a contractor for their NEPA document (EIS) which will be used in the Marine Mammal Protection Act of 1972 (MMPA) rulemaking. The NMFS is issuing a proposed rule following MMS' submission of a petition package for the incidental-take of

marine mammals and reptiles during the removal of OCS platforms. NMFS hopes to publish the final proposed rule by the end of June 2007.

1.4.6 Social Sciences and Economics

Generally, social impact assessment (SIA) projects the effects of new actions on unaffected baselines. In the GOMR, SIA evaluates the effects of a “new” action on a baseline that has experienced 70 plus years of past and ongoing consequences of similar “new actions.” Because the modern offshore petroleum industry was born and evolved in the Gulf, SIA faces unique challenges. On one hand, while much SIA is “what if” stories, any effects that offshore oil activity has had are likely to have actually occurred somewhere in the GOMR (National Research Council, (NRC) 1992). On the other, finding them proves difficult since they must be disentangled from other social and economic changes and trends that are occurring, since current industry effects must be disentangled from those past, and past ones that continue to affect the present. In addition, the offshore petroleum industry is a massive assemblage of many and varied enterprises, each with its own needs for capital, goods and services, its own labor conditions and community relationships, its own technological and organizational dynamics, and its own past, current and future impacts. Current Gulf social and economic studies planning is the product of a two-decade struggle with these challenges; it builds on suggestions gleaned from six national and regional reviews of the ESP from this same period, on its own successful and less successful attempts to address these conundrums, and on an ever emerging, never complete vision of what the industry is and where it is going.

No single research strategy could address all these complexities, and the Gulf ESP approaches this puzzle from three basic directions and with multiple methodologies. First, unlike most SIA, the ESP emphasizes the industry itself. The industry’s size, variability, and longevity mean that characteristics and distributions of its various sectors shape the socioeconomic baseline that changes in its sectors generate its future effects, and that data on these sectors is needed to calibrate the models used to estimate its consequences and future effects. Much ESP effort describes and measures key industry sectors (e.g., drilling, production, fabrication, transportation) and uses this information to assess local and regional impacts. Three study profiles focus on industry. “Deepwater Platforms from Plan to Production” is a second attempt to document the types, quantities, and origins of goods and services used by deepwater projects. “Alternative Energy Project Scenarios and Local Community Issues” will provide standard information to support the assessment of offshore alternative energy projects. Finally, “Understanding Current and Projected Gulf OCS Labor Needs” will improve our ability to identify, regionalize, and project OCS-driven labor force issues. The move into deepwater, growing interest in alternative energy and renewed interest in the Atlantic, and the push to address local-level effects are significant concerns in the Gulf.

The second strategy focuses on developing a “dynamic baseline”. All SIA begins with the baseline but, in the Gulf, the need to disentangle industry effects from other trends and events turns this into a substantial and iterative task. Much past ESP research aimed at developing this baseline and the growing State and stakeholder emphasis on local-level impacts has sharpened this focus. “History of GOMR Offshore Petroleum Industry, Phase III: Deepwater Developments” builds on earlier efforts that have helped define local issues, impacts, and

industry-driven socioeconomic change. While SIA emphasizes rural issues, many GOMR socioeconomic impacts concentrate in metropolitan areas. The study “Socioeconomic Effects of the Offshore Petroleum Industry on Urban Communities” aims at identifying OCS-related effects in these areas, and at developing methodologies for assessing them.

A third strategy focuses on standard SIA social and cultural issues. Two study profiles fit here. “Ethnic Groups and Enclaves Affected by OCS Activities” will identify groups that have or are likely to experience socioeconomic effects. Second, SIA normally addresses a set of local effects on public infrastructure and services that the embedded quality of the Gulf OCS industry has made difficult to identify. “Gulf Coast Communities and the Offshore Petroleum Industry: A Comparative Community Study” will analyze when, and under what conditions, these impacts have occurred. The goal is to make community-level assessments more robust and to also contribute to the design of a monitoring methodology.

These three approaches have different foci (the industry, baseline, and SIA) however, these are useful perspectives on the same assessment problems, and they work synergistically. For example, “Ethnic Groups and Enclaves Affected by OCS Activities” supports the analysis of who benefits or is burdened, a basic SIA and Environmental Justice question. However, it also adds significantly to the assessment of local-level baseline dynamics and of labor demand, since many fabrication sector workers are of foreign origin. Links between past, present, and future efforts are noted in the profiles.

Two archaeological resources studies have been proposed. We are proposing to ground-truth several targets in the Atlantic Region that have been identified in recent years through surveys to determine whether these targets are significant archaeological resources. With increased deepwater development, the Gulf study, which focuses on the discovery of historical documents pertaining to the Colonial Period, will provide a greater understanding of the historic shipwrecks in the ultra-deepwater. Both of these studies will help fulfill MMS requirements under Section 106 of the National Historic Preservation Act (NHPA).

1.4.7 Gas Hydrates

Interest in gas hydrates has waxed and waned over the past 30 years. With the spike in natural gas prices in early 2001 and interest in alternative fuel sources, interest is again focused on gas hydrates. If hydrates do become an economically viable resource, environmental assessments will require an understanding of the location and distribution of the resource. The MMS joined the ChevronTexaco hydrate joint industry project (JIP), which conducts research into gas hydrates in the GOM using funding from the Department of Energy (DOE). The MMS ChevronTexaco JIP has been extended through 2009. To date, the DOE is funding \$11 million and industry is adding \$2 million to study and characterize gas hydrates in the GOM. The project is focusing on hydrates as a geohazard as well as a resource.

1.4.8 Other Studies

The Atlantic Ocean has a complex and diverse marine mammal community. Sea turtles are a major concern within the Atlantic Ocean as worldwide fisheries interactions and other

potential impacts place individuals at risk. Under the Endangered Species Act (ESA) and the MMPA, these species are given particular legal status. The status of Atlantic protected species populations and any potential impacts that MMS regulated activities may have on these populations are significant program concerns. The proposed Atlantic workshop is to evaluate Atlantic Ocean protected species issues, review recent developments in research techniques, and set priorities for future information and research needs.

SECTION 2 PROPOSED STUDY PROFILES

2.1 Introduction

The following sections focus on the proposed studies for FY 2007 and FY 2008. Most of the ongoing studies in the GOMR can be found on the web at:

http://www.gomr.mms.gov/homepg/regulate/environ/ongoing_studies/gom.html

Additional information about recent MMS funded deepwater research, in particular research cruises, can be found at:

<http://www.gomr.mms.gov/homepg/regulate/environ/deepenv.html>

2.2 Profiles of Studies Proposed for the Fiscal Year 2008 NSL

Table 1. Gulf of Mexico Region Studies Proposed for the Fiscal Year 2008 NSL

Page #	Discipline	Title	Rank
15	PO	Dynamics of the Loop Current in the Gulf of Mexico	1
17	MM	Seismic Activities and Marine Mammal Observer Reports in the Gulf of Mexico	2
19	HE	Continued Investigations of Northern Gulf of Mexico Deepwater Natural and Artificial Hard-Bottom Communities with Emphasis on <i>Lophelia</i> Coral	3
23	AQ	Meteorological and Wave Measurements for Improving Meteorological and Air Quality Modeling	4
25	SS	Ethnic Groups and Enclaves Affected by OCS Activities	5
27	SS	Deepwater Platforms from Plan to Production	6
29	SS	History of Gulf of Mexico Offshore Petroleum Industry, Phase III: Deepwater Developments	7
AQ = Air Quality FE = Fates & Effects HE = Habitat & Ecology IM = Information Management MM = Marine Mammals & Protected Species PO = Physical Oceanography SS = Social Sciences			

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Areas: Eastern and Central

Title: Dynamics of the Loop Current in the Gulf of Mexico

MMS Information Needs to be Addressed: The results of the study will help improve forecasting of eddy shedding by the Loop Current (LC). This improved forecasting capability will be used by MMS and Industry to prepare for and avoid high currents induced by warm eddies during exploration and production activities. Avoidance actions directly reduce downtime, losses or accidental releases, and fatigue, all which are of concern to MMS.

Cost Range: (in thousands) \$4,400-\$6,600 **Period of Performance:** FY 2008-2013

Description:

Background: The most influential driving force in the GOM is the LC. The Loop is the main source of water for the Gulf, transporting relatively warm and salty waters from the Caribbean Sea at a rate of 25-30 Sv. During its north-south incursion cycle, the LC sheds large warm or anticyclonic eddies (diameters of 200-400 km) that propagate to the western Gulf at speeds of 4 to 8 km·day⁻¹. This strong jet, with surface velocities on the order of 150 cm·s⁻¹ dominates the mesoscale variability of the Gulf, especially in deep waters, and is the source of topographic Rossby waves and near bottom-trapped eddies. This strong current is also the beginning of the Gulf Stream Current, which is part of the meridional circulation of the Atlantic Ocean. Despite these superlatives, very few studies of this potent current have been completed in the past. Most of our current knowledge of this current is through indirect methods or hydrographic surveys, satellite studies, numerical modeling, and few moorings (~ five) placed on this feature. Based on statistical analysis of satellite data, we know that it penetrates into the northern Gulf at intervals of 0.5-18 months and once it reaches its most northerly position, it breaks and sheds a large warm Loop Ring.

Recently, strong and nearly barotropic currents have been observed below ~1,000 m in depths > 2000 m. These strong currents are associated with large bathymetric gradients and the presence of topographic Rossby waves with periods of 10 to 30 days. Also, strong currents are associated with near bottom eddy-like features in the neighborhood of the steep topography. Recent observations and ray tracing techniques suggest that Rossby waves originated near the LC in the eastern Gulf, but we lack unequivocal data on this and even the mechanism(s) to generate these Rossby waves.

Objectives: The purpose is to improve understanding of the dynamics of the LC. The objective is to understand the dynamics of the shedding mechanism and coupling between surface and bottom flows including study of how the LC might generate topographic Rossby waves and near-bottom eddy-like features in the neighborhood of the steep topography.

MMS will take advantage of the upcoming U.S.-Mexico workshop, to refine the scope and objectives of this study.

Methods: Standard oceanographic methods (moorings, PIES, and hydrographic surveys) will be employed to collect ocean current data and to analyze the resulting data to extract as much information and knowledge as possible from it. Satellite data will be needed to provide the synoptic view plus data on other aspects of the LC available only through this technology. The possibility of extending the array into Mexican waters and cooperating with their researchers will be explored during the final planning stages of this study. The performance period will be divided into three years of field work and data collection, and two years for data analyses and report completion. The MMS has a sizeable inventory of equipment which resulted in substantial savings to the estimated cost.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico
Planning Area: Gulfwide
Title: Seismic Survey Mitigation Measures and Marine Mammal Observer Reports

MMS Information Needs to be Addressed: This study will provide information about the existing seismic survey mitigation program. By a thorough review of all reporting received since the inception of the program in 2002, MMS will be able to quantify many facets of the program and evaluate its effectiveness. In addition, received data on geophysical activities in the GOM can be compared with projected estimates used in NEPA documents. These data will provide much needed information to both MMS and NMFS as the MMPA rulemaking process continues.

Cost Range: (in thousands): \$100-\$150 **Period of Performance:** FY 2008-2009

Description:

Background: As a result of the 2002 NMFS Biological Opinion for Lease Sale 184 (Western Planning Area), MMS implemented a Seismic Survey Mitigation Measures Notice to Lessees (NTL). This initial NTL (2002-G07) has subsequently been updated (2003-G08; 2004-G01; 2007-G02) and expanded to include a variety of mitigations and reporting requirements. These measures apply to all on-lease surveys conducted under 30 CFR 250 and all off-lease surveys conducted under 30 CFR 251. Seismic operators in the GOM are required to submit reports on the 1st and 15th of each month. Reporting requirements include an observer effort report, survey reports and sightings report. These reports are sent electronically to MMS through a protected species mailbox (protectedspecies@mms.gov) which is monitored by a protected species biologist in the Leasing and Environment (LE) section. As part of the original Biological Opinion that resulted in the seismic survey observer program, NMFS also required that an annual report be submitted documenting all sightings of sperm whales and sea turtles, the species likely to be sighted currently listed under the ESA. As a result, MMS now has considerable data from the observer program and is in a position to evaluate existing mitigations and their effectiveness. These data would be timely for both MMS and NMFS as we proceed through the MMPA rulemaking process.

Objectives: The purpose of this study is to summarize and synthesize submitted seismic survey observer reports for the years 2002-2006. After synthesis of these data, recommendations will be made as to the effectiveness of required mitigation measures, as well as suggestions for new and/or improved mitigations.

Methods: Due to the proprietary nature of the reports, this analysis will require close coordination with LE personnel. Working with existing spreadsheets and data, a separate analysis of all three reports (observer effort, survey, and sightings) will be completed.

Characterizations of seismic activity levels, species occurrence and behavior, and observer effort are among the types of data that will be analyzed. Additional details about the types of data collected for each report can be found in the latest NTL No. 2007-G02.

<http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g02.pdf>

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Areas: Western and Central

Title: Continued Investigations of Northern Gulf of Mexico Deepwater Natural and Artificial Hard-Bottom Communities with Emphasis on *Lophelia* Coral

MMS Information Needs to be Addressed: Knowledge of the distribution and sensitivity of unique biological habitats in deep water is necessary for management decisions. Study results will help to further refine current mitigations and need for avoidance of hard-bottom areas in deepwater. There is also a need to understand the ecological role of deepwater platforms or other deepwater oil and gas related structures serving as artificial reefs in the GOM in order to make decisions regarding decommissioning. Inclusion of shipwrecks as additional artificial reef areas will also meet information needs for identification of unknown sites and increase understanding of metal corrosion rates.

Cost Range: (in thousands) \$2,480-\$4,200 **Period of Performance:** FY 2008-2012

Description:

Background: It is well known that there are many locations with significant areas of hard-bottom in the deep GOM, particularly associated with faulting above the tops of salt diapirs. These hard-bottom areas are generally created through biogenic precipitation of carbonate by chemosynthetic bacteria. Carbonate deposits can subsequently become exposed above surrounding slope sediments providing substantial substrate for attached animal communities to develop. These are well represented on 3D seismic surface anomaly geophysical maps used during the biological review process of potential impacts from proposed drilling operations or pipeline installations. An initial study has demonstrated the presence of numerous deepwater coral communities in the deep GOM but information is lacking for informed decisions regarding distribution and sensitivity to impacts.

The previous *Lophelia* study, *Characterization of Northern Gulf of Mexico Deepwater Hard-Bottom Communities with Emphasis on Lophelia Coral* (Continental Shelf Associates, in preparation) was an important step in gaining knowledge of previously unknown sensitive biological features in the deep GOM. This study and final report will be completed and released in May or June 2007. Deepwater corals have become an increasingly significant habitat and area of study throughout the world.

The initial study, *Lophelia* I has proven to be very enlightening and successful as far as it was capable of progressing with the field time allowed by that project's limited budget. Significant unanswered questions and new directions have become evident from the results of the initial study. Focused studies and process-oriented research will be necessary to further

develop an understanding of the distribution of deep coral habitats. Of particular significance is determining the probability of where high-density coral communities will be found on exposed hard-bottom substrate.

As an additional aspect of hard-bottom habitat, this next phase has been expanded to include artificial reefs created by both oil and gas structures in deepwater as well as shipwrecks. Initially, a separate study named *Deepwater Artificial Reef Effect II* (DARE II) (a follow up to the WWII shipwreck study; Church et al., 2007 in press) was scheduled for a single year's field work to look at older deepwater platforms. This profile now merges the DARE II objectives with the *Lophelia* II study that has been deferred from 2007 procurement to 2008.

It is generally accepted that artificial reefs can serve a positive function by the creation of new hard-bottom habitats in areas where hard-bottoms are naturally lacking (most of the GOM). In the case of fish, artificial reefs can act both as attraction devices and as new habitats where new fish biomass is created and exported, meaning production. The fouling community growing on new hard-bottoms provided by artificial substrate is unquestionably new production for those organisms that require hard substrate. The trophic linkages between the flux of organic material to deepwater fouling communities and potentially related fish communities are not well understood.

There are now numerous industry-related structures at water depths below 1,000 ft in the Gulf. The use of sub-sea completions on the sea bed is rapidly increasing. The number of sub-sea completion installations has risen from just four in 1990 to 51 in 2001, and nearly three fourths of these occurred in deepwater (>1,000 ft). A total of 102 were installed in deepwater between 2000 and 2003. Examples of extraordinary solid platforms include the Cognac and Bullwinkle platforms in 1,023 and 1,353 ft of water, respectively. Bullwinkle has now been in place for 17 years and Cognac for 26 years. A third structure, the Pompano platform at a water depth of 1,430 ft in block VK 989 has already been documented to have *Lophelia* coral growth on parts of its structure and it was only nine years old at the time of those observations. In Green Canyon Block 184, an EA has already been completed for the removal of the Gulf's first tension leg platform at a water depth of 1,762 ft. The operator, ConocoPhillips requested that they be allowed to leave the massive template on the seabed. There is a good possibility that this structure is colonized by deepwater corals that are known to exist at the nearby chemosynthetic community Bush Hill in GC 185.

In the near future, decisions will be required for the removal of structures located in water depths beyond the continental shelf. Current guidelines outlined in 30 CFR Part 250.1728 allow the MMS Regional Supervisor to approve alternate plans for removal of structures when the water depth is greater than 2,624 ft (800 m). Options for removal at shallower depths have previously relied on the concept that the structure left behind would serve as a positive fisheries enhancement or other beneficial environmental function. The MMS now has a direct need for information that will help describe any significant ecological role (if any) that man-made structures may have in deepwater of the GOM. A recent study *Archaeological and Biological Analysis of World War II Shipwrecks in the Gulf of Mexico: Artificial Reef Effect in Deepwater* (Church et al., 2007 in press) first approached this subject. This project

was in effect DARE I but looked specifically at older man-made structures represented by shipwrecks. Remarkable discoveries were made on some of the shipwrecks investigated during this project. One wreck was particularly significant, the *Gulfpenn* sunk in 1942, which provided a known recruitment time of 62 years. Numerous large colonies of *Lophelia* coral were discovered growing on the wreck located at a depth of 1,820 ft.

Objectives: The purpose of this follow-up study is to focus on remaining questions that will define environmental conditions that result in the observed distribution of significant high-density hard-bottom communities that are sensitive to impacts from oil and gas development activities (especially extensive areas of *Lophelia* coral). The use of artificial reefs of all kinds including platforms and shipwrecks (man-made hard-bottom) should be utilized to enhance the understanding of variables controlling zoogeography. The additional objectives of this combined study will be to further explore the basic question, “Do man-made artificial structures function as artificial reefs in deep water?” Additional objectives also include the investigation of previously unexplored shipwrecks of the deep Gulf as well as returning to previously visited WWII wrecks to recover ongoing experiments.

Methods: Similar to the previous *Lophelia* I study, this project may require the use of a manned submersible for the fine scale observation and sample collections required to describe new, high-diversity biological communities. A high-end ROV could also fulfill most, if not all study needs. ROV’s will likely be necessary for the shipwreck aspects due to the danger of entanglement for manned submersibles. In addition, it is expected that a number of collaborations will continue with USGS. Some complementary elements of this project will be conducted by investigators from various USGS locations resulting in cost sharing benefits for many investigators and broader approaches to additional ecological disciplines. This project is also anticipated to be sponsored by the NOPP and partnering with the NOAA’s Office of Ocean Exploration for cost sharing of submergence and research vessel facilities during some, or possibly all of the field sampling years.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Area: Gulfwide

Title: Meteorological and Wave Measurements for Improving Meteorological and Air Quality Modeling

MMS Information Needs to be Addressed: Meteorological and wave measurements are needed to improve meteorological and air quality modeling and to derive dispersion parameters for use in air quality model and assessment. These field measurements will improve the accuracy of meteorological and air quality models and benefit air quality assessments to be used in environmental impact statements. The data will be used to improve air quality modeling used to predict and assess 8-hour ozone, visibility, and haze in NEPA documents.

Cost Range: (in thousands) \$400-\$600

Period of Performance: FY 2008-2010

Description:

Background: Meteorological and wave measurements will be used to characterize the atmospheric boundary structure and air-sea interaction (flux parameterization) and to test theories (e.g., COARE algorithm, flux calculations) such that this information can be used to improve the application of meteorological and air quality models in the offshore environment and the coastal area. The MMS has conducted several meteorological studies in the GOM however, these wind measurements need further updating for offshore meteorological and air quality assessments.

In previous MMS studies, the simultaneous measurements of wind and wave in the lower level of the atmospheric boundary layer offshore were not available and there were data gaps between 10m and 100m. The information gathered from previous studies will help set up a more comprehensive field measurement system to collect more accurate wind and wave data. The proposed study will take advantage of existing boundary layer studies and provide updated data, science and information for improving the accuracy of meteorological, and air quality modeling. Therefore, it is proposed to install a meteorological measurement system offshore to obtain information for atmospheric boundary layer study.

Objectives: The objectives of this study are to characterize the atmospheric boundary layer structure and air-sea interaction for improving meteorological and air quality modeling over coastal transition zone, shallow water and deep water areas. Furthermore, this study is to focus on the data gaps between 10 m to 100 m above the sea surface and the transition zone between land and ocean.

Methods: Conduct field observations and data collection. Plan and install a new wind measurement system using wind profilers, sodar, buoys, and meteorological wind measurement sensors mounted on an offshore platform or a 100 m meteorological tower.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico OCS Region

Planning Area: Gulf wide

Title: Ethnic Groups and Enclaves Affected by OCS Activities

Cost Range: (in thousands) \$320-\$480

Period of Performance: FY 2008-2010

MMS Information Needs to be Addressed: NEPA, Environmental Justice, and laws addressing Native Americans direct agencies to consider the possible effects of their decisionmaking and proposed actions on minority and low income groups. This study will support Agency decisionmaking and assessments by identifying minority and low-income groups that may be affected by the OCS program. It will provide background information (baselines) on identified groups and insights into how specific groups have been affected in the past and how they may be affected in the future. The information and analyses will be incorporated into GOMR EIS's and Environmental Justice analyses as it becomes available.

Description:

Background: Coastal areas of the GOM have been long known for their ethnic and racial enclaves - products of unique environments and history. A study of 1950 Louisiana divided the State into the Francophone Catholic South and English-speaking North, and then into numerous "cultural islands" (Bertrand, 1955). These "islands" varied greatly shaped by the conditions under which groups had emerged, their size, and their integration into the larger society and economy as much as by characteristics of the groups themselves. There were small communities (e.g., Czechs of Kolin and Libuse), regionally wide-spread minorities (e.g., the "Black Belt"), and regionally dominate minorities (e.g., Cajuns). While situations have changed since 1950 and some islands have disappeared, others remain and new ones have emerged as small communities and as regional minorities.

Many of these groups have been affected by the rise of the offshore oil industry and its continuing operations. Louisiana's Cajuns, for example, have in some measure been self-defined by their participation in the petroleum industry (Henry and Bankston, 2002), while a smaller Alabama ethnic enclave (also called "Cajuns") found work in the refining industry to lead more readily towards assimilation (LaFoy, 1988). More recent history has led to the creation of additional ethnic enclaves that have related to the oil industry in one way or another. While Vietnamese and Laotians have settled along the coasts as commercial fishermen, they have also become part of the shipbuilding and fabrication workforce, a role that has also been assumed by Mexican immigrants (Donato, 2004; Donato et al., 2001). Many of these groups are also subject to the environmental impacts of the OCS industry (Hemmerling and Colten, 2003).

NEPA and the Presidential directive on Environmental Justice in particular, direct Federal agencies to consider the possible disproportionate, negative effects of its actions on minority and low income populations. Identifying the various minority groups in proximity to the coasts, to onshore OCS-related infrastructure and activities, and to important transportation routes will facilitate a more detailed Environmental Justice analysis. Beyond this, the experiences of many of these groups exemplify the numerous and varied social and economic effects of the OCS program at the local level. Much has been written about ethnicity and ethnic groups in the Gulf Coast states, of their locations, characteristics and conditions, and of their integration and non-integration into the surrounding society and economy. A NEPA-oriented synthesis and assessment of the available material will support Gulf social impact assessments at the local and regional level and facilitate the identification of relevant information gaps (if any) in the available literature.

Objectives: This study will:

- identify ethnic groups, ethnic enclaves, and ethnic communities relevant to the assessment of the social consequences of OCS activities;
- describe the location, origins, characteristics, and current conditions of these groups, enclaves, and communities;
- describe the history and processes of social and economic integration of these groups, enclaves, and communities into the surrounding society and assess current conditions; and
- describe how these groups, enclaves, and communities have interacted with, and been affected by petroleum development.

Methods: This study will be primarily a review and synthesis of existing published and “gray” literature, although it will mine other public information sources (e.g., Census data, sociocultural databases such as the transcripts from the MMS study “History of Offshore Oil Development in the Gulf of Mexico, Phase II: Research and Synthesis” and conduct limited “fieldwork” face-to-face or by e-mail and telephone (e.g., with state folklorists, local librarians, and historical societies) to identify, supplement, and evaluate the existing literature. Data will also be assimilated from three ongoing MMS studies; “Environmental Justice: A Comparative Perspective in Louisiana” (Hemmerling and Colten); “Gulf Coast Communities and the Fabrication and Shipbuilding Industries: A Comparative Community Study” and “Post-Hurricane Assessment of OCS-related Infrastructure and Communities in the Gulf of Mexico Region”. Available literature is uneven, addressing some groups and issues more thoroughly than others. This effort will emphasize the identification, acquisition, evaluation, and assimilation of existing materials.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico OCS Region

Planning Area: Gulfwide

Title: Deepwater Platforms from Plan to Production

Cost Range: (in thousands) \$240-\$360

Period of Performance: FY 2008-2012

MMS Information Needs to be Addressed: The move into GOM deepwater has substantially changed the planning, financing, construction, and operations of offshore projects. Understanding these changes is critical for assessing the OCS program's onshore economic effects and the Gulf industry's future directions *vis a vis* the world-wide industry and will support agency understandings of current (baseline) conditions and trends as well as agency assessments of future social and economic effects. Such a study will also provide stakeholders and the general public with an accurate picture of the complexity of the industry and its benefits to the Nation.

Description:

Background: An operating deepwater platform is massive, complex, technologically advanced; it is the final product of activities that are concentrated in the Gulf but that have no national borders. Deepwater petroleum resources have proven to be unexpectedly large, but the size, complexity, and costs of deepwater projects have pushed the industry toward rapid innovation and reorganization raising the economic stakes, the payoff for efficiencies, the costs of failures, and the importance of finance and planning. Thus, in a very material and inherently interesting form, each project expresses the major industrial, organizational, and financial trends that are reshaping this very important sector of the Gulf Region and U.S. economy. MMS sponsored a similar study (Stiff and Singlemann, 2004) with limited success due to study design problems. For that effort, MMS identified completed projects to be studied. Researchers found that project information is often not retained for completed projects. They also discovered much of the information is held by subcontractors who do not necessarily release it. Second, MMS under-scoped the effort of tracing project demand outside of the Gulf Region. This current study specifies few projects.

Objectives: The objective is to describe the development of two deepwater platforms from the planning stage into their early operations.

Methods: The study will: (1) identify the stages in the development and installation of a deepwater platform; (2) for each stage, describe the tasks, the labor force, the goods and services purchased, and their origins and expenditures; (3) describe each completed platform and major components; and (4) describe each platform's early operations, manpower requirements, and supply systems. The study will accomplish this through analysis of primary data, literature review, and collection of information from a few selected key

informants. The fabrication and transportation of major components of the platform will be included. This study draws on lessons learned from difficulties encountered by an earlier, similar MMS-sponsored effort (Stiff and Singelmann, 2004). While many stakeholders, including the petroleum industry itself, would welcome the descriptions and data that this study seeks, because of confidentiality and subcontracting issues, the information is also difficult to collect. The study will be designed to address these considerable difficulties can be revised accordingly during the course of the research. It will have several characteristics. First, researchers must work with companies and industry representatives to identify projects to study, to develop study methods, and to evaluate research progress and products. Second, research must begin prior to project startup because data acquisition must be part of the project planning process. Finally, the methodology must be flexible to address problems of missing and proprietary data.

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ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2008-2010

Region: Gulf of Mexico

Planning Areas: Central and Western

Title: History of Gulf of Mexico Offshore Petroleum Industry, Phase III: Deepwater Developments

Cost Range: (in thousands) \$320-\$480

Period of Performance: FY 2008-2009

MMS Information Needs to be Addressed: While any research that gives this industry a “human face” would contribute greatly to the OCS program, the Gulf, and the country, this effort has programmatic objectives. (1) It will document important social and economic effects of the industry. The National Research Council (NRC) noted that the GOMR’s fifty-year history of offshore oil provides a natural laboratory for studying its effects. To “calibrate” this laboratory, changing industry dynamics and interactions with the communities (e.g., technological evolution, and changes in business and employment practices) must be understood. (2) NEPA charges MMS with assessing cumulative effects of the industry. Unraveling cumulative effects from this fifty-year “baseline” requires the kind of detailed analysis that this study can provide. (3) Associated with this issue, this effort will synthesize the findings of previous MMS socioeconomic research, as requested by the SAC and others. It will engage a wide range of experts in this synthesis. (4) The study will help distinguish the effects of onshore oil from offshore oil, and offshore oil from developments in the deepwater GOMR. (5) The social and economic effects of the offshore industry are often defined abstractly, in terms of literature on other industries in other regions. This study will serve as a “scoping” vehicle by letting affected parties define the salient social and economic issues in a non-adversarial milieu. The study has been organized to provide the agency with effective outreach to other Federal and State institutions as well as communities. (6) Finally, the study can be considered as “mitigation”. Knowledge about the industry and its origins are of value to the people of the State of Louisiana.

Description:

Background: The development of Louisiana’s offshore petroleum industry is a remarkable story of hard work, inventiveness, entrepreneurial spirit, and risk-taking that turned the State’s relatively isolated and impoverished coastal communities into significant contributors to the U.S. and world economies. This study follows the footsteps of Phase I and II of this MMS-funded research, an effort to collect oral histories and use them to address the evolution of the early offshore oil industry, including the development of the related service, support, and

fabrication industries that give this industry its unique economic and social profile (see Austin et al. 2004 and the ongoing study “History of Offshore Oil Development in the Gulf of Mexico, Phase II: Research and Synthesis”).

This history project is methodologically innovative by joining oral history research conducted within communities with more analytical socioeconomic research conducted at universities. The previous efforts refined the methodology and management structure needed to coordinate community-centered and -driven research with the analytical goals of environmental impact assessment, and it produced a series of analytical papers, scholarly presentations, and public exhibits. These efforts were shaped by the fact that the offshore industry is little known, understood, or documented, and that important knowledge of its development was being lost each time one of its pioneers passed away. Thus, Phase I and II emphasized collecting, transcribing, and archiving oral histories more than their analysis, and focused on interviewing the earlier pioneers rather than on specific questions about the industry and its development. These efforts created one of the largest oral history collections in the Nation. Its inclusion of big and small players, family members, and members of the involved communities supported a series of analytical papers that provided new insights into the development of the OCS industry and its social and economic consequences at regional and local levels. The study provided to the public invaluable material on their history, heritage, and communities responded by providing places to house, publicize, and access the materials that were collected.

Earlier efforts have provided an abundance of detail and insights in support of MMS analytical needs. Phase III of the “History of the Gulf of Mexico Petroleum Industry” will build on previous project accomplishments, but will emphasize a focused collection and analysis of oral histories that address issues surrounding the industry’s move into the deepwater Gulf. Industry-community changes during this move are particularly relevant to MMS assessment concerns.

Objectives: This study will:

- collect and transcribe interviews with the pioneers of deepwater activities, with other key informants and experts, and with family and community members affected by the development of deepwater activities;
- develop educational materials and facilitate their availability to the interested public; and
- describe and analyze issues raised by deepwater developments that are relevant to agency management decisions on the Federal OCS and to its EA’s. Among others, topics will include: (1) changing business models due to deepwater project demands; (2) changing labor conditions and recruitment; (3) effects of these changes on Louisiana and Texas communities; and, (4) effects of Federal regulations on environmental and safety consciousness.

Methods: The study will examine the role of, challenges to, and changing nature of technology (exploration, development, production, transportation, and fabrication),

economics, labor organization and demand, business organization and practices, and other factors as the offshore industry moved into the Gulf's deep waters. The study will look at the role played by local communities and the environment in shaping these developments and in turn, the role that changes to the industry has played in shaping the communities. Finally, the study will examine the development of the State and Federal regulatory regime as a response to this massive industry.

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2.3 Profiles of Studies Proposed for the Fiscal Year 2009 NSL

Table 2. Gulf of Mexico Region Studies Proposed for the Fiscal Year 2009 NSL

Page #	Discipline	Title
35	SS	Alternative Energy Project Scenarios and Local Community Issues
37	SS	Continued Monitoring of Industry Compliance, Biological Sampling, and National Register of Historic Places Evaluations of Submerged Sites on the Gulf of Mexico Outer Continental Shelf
39	SS	Gulf Coast Communities and the Offshore Petroleum Industry: A Comparative Community Study
41	SS	Investigation for Potential Spanish Shipwrecks in Ultra Deepwater
43	HE	Investigation of Potentially Sensitive Biological Features Surrounding Shelf-Edge Topographic Banks in the Northern Gulf of Mexico
45	HE	Long-term Effects of Oil and Gas Activities on the Mississippi–Alabama-Florida Shelf
49	PO	Reanalysis of Available MMS Databases for New Insights
51	SS	Socioeconomic Effects of the Offshore Petroleum Industry on Urban Communities
53	MM	Sperm Whale Acoustic Prey Study (SWAPS)
55	SS	Understanding Current and Projected Gulf OCS Labor Needs
AQ = Air Quality FE = Fates & Effects HE = Habitat & Ecology IM = Information Management MM = Marine Mammals & Protected Species PO = Physical Oceanography SS = Social Sciences		

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Areas: Eastern, Central, and Western Gulf of Mexico; North and Mid-Atlantic

Title: Alternative Energy Project Scenarios and Local Community Issues

MMS Information Needs to be Addressed: This will be the first MMS effort to collect economic and related community-level information on alternative energy projects likely to take place in the planning areas of the GOM and Atlantic Regions. The information will be used for developing sections of EIS's, particularly for analyzing and discussing the economic and social impacts of alternative energy projects. Information collected may also be used to expand the agency's existing economic impact model to add the capability of analyzing alternative energy projects.

Cost Range: (in thousands) \$400 - \$450

Period of Performance: FY 2009 -2011

Description:

Background: The Energy Policy Act of 2005 grants MMS new responsibilities over Federal offshore renewable energy and related-uses of the OCS, such as wind and wave energy projects. Under this new authority, MMS also becomes the lead Federal agency of permitting and regulatory oversight. Currently, there is substantial interest in renewable energy on the Atlantic and GOM OCS, particularly in wind power and several projects already under consideration. Thus, new responsibilities have already led to new information needs. MMS has neither conducted any studies to predict where future alternative energy projects may occur, nor examined the potential socioeconomic effects of these projects on local communities. This study will help fill a critical information gap that will be needed in future MMS EA's. In light of this new responsibility, MMS needs to begin collecting the data and information necessary to analyze the economic and social impacts of these new types of projects.

Objectives:

- gain a better understanding of the capital and labor requirements of the alternative energy projects most likely to take place in the planning areas of the GOM and Atlantic Regions;
- predict likely locations for future offshore alternative energy projects (wind, wave, solar, and other projects that make use of existing oil and natural gas platforms) by examining the necessary technical, environmental, and market conditions (including options/availability to tie in to existing energy infrastructure);
- identify communities that are most likely to support alternative energy projects; and

- describe the existing socioeconomic conditions in these locations and identify the communities most likely to be impacted by alternative energy projects.

Methods: The methodology will consist of a literature review, data collection from public sources (including information on existing projects in other countries), discussions with key industry and community representatives, and analysis and synthesis of the collected data and information to develop different sets of likely project scenarios. For each sample project, the types of available technologies that could be used will be examined, including different capital input options, where the capital equipment is produced (supplied locally, within the U.S., or foreign-produced) and what it costs (capital expenditures), the amount of labor and types of labor skills required, etc. for each stage of the project (construction, operation, and decommissioning). The study will also examine the energy and public infrastructure investments that would be needed to support the projects.

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ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Area: Gulfwide

Title: Continued Monitoring of Industry Compliance, Biological Sampling, and National Register of Historic Places Evaluations of Submerged Sites on the Gulf of Mexico Outer Continental Shelf

MMS Information Needs to be Addressed: This study will evaluate mitigated avoidance areas from industry-permitted actions. The targets selected for study will come from a list of sidescan sonar targets that have been identified as having a high probability of being archaeologically significant and required avoidance during industry-permitted activity. The analysis will incorporate archaeological and biological observations of each target. Information obtained will assist the MMS Social Sciences Unit to determine if targets identified for avoidance are actually associated with archaeological resources. It will also provide information on the area of expected debris fields associated with historic shipwreck sites. This information will be used to develop avoidance criteria for archaeological sites on the OCS. This study will help fulfill MMS requirements under Section 106 of the NHPA. Additionally, this study will investigate the biological component of these sites to complement the results of other MMS-funded studies that evaluate the artificial reef effect of wrecks and other man-made objects in the Gulf.

Cost Range: (in thousands) \$200-\$300

Period of Performance: FY 2009-2010

Description:

Background: Federal agencies have, under Section 106 of the NHPA, the responsibility to consider the effect of agency actions on significant archaeological resources. While MMS has adhered to Section 106 by requiring industry to conduct remote sensing surveys and avoid potential targets, minimal testing has been performed to ascertain the effectiveness of this requirement or to determine if the remote sensing targets that are selected have any real archaeological significance. Ground-truthing targets that have been recommended for avoidance provides the MMS an opportunity to assess industry compliance of permitted activities. An initial MMS study, completed in June 2006, was successful in investigating 14 unidentified sidescan sonar targets that had been recommended for avoidance by industry-related activities. Of these 14 targets, five of these sites were identified as historic shipwrecks and three will be nominated to the National Register of Historic Places.

Additionally, while another recent MMS study has developed a formula for determining appropriate avoidance distances for historic 20th century shipwrecks in deepwater, no such formula has been attempted for historic shipwrecks along the shelf. The knowledge gained from this study will allow the MMS to implement management practices that can more

accurately identify how significant resources appear in the remote sensing record. This adaptive approach will assist in determining a more practical avoidance radius for these resources. The MMS imposes on industry a more rigorous survey requirement in areas where it believes resources may be located. By identifying the actual locations of those resources, it should be possible to remove more stringent survey requirements from some lease blocks.

The biological component of this study will collect information on condition and composition of the associated attached invertebrate communities and closely associated fish assemblages at each of these sites. MMS has a long history of studying the artificial reef effect of oil and gas platforms in the GOM. This study will compliment these efforts and provide important comparison information on the significance of these unique types of artificial reefs.

Objectives: The objectives of the study are to ground-truth, positively identify, and assess the National Register status and biological community composition associated with eight to fifteen selected targets identified in industry-submitted remote sensing surveys; evaluate associated debris fields to develop a model of appropriate avoidance criteria; and assess the size and health of the biological communities that use these sites for habitat. This project will build on the efforts of an initial undertaking to assess remote sensing targets that appear likely to be related to an archaeological site, as well as enhance the amount of biological data available on reef communities in water depths less than 130 feet below the surface. New potential targets are continuously reported to the MMS as the oil and gas industry continues to conduct surveys of the seafloor. In fact, over 20 such targets were reported to the MMS GOMR in a recent four-month period (October 2005 through January 2006). At present, these sites range in depth from 20 feet to over 6,000 feet.

Methods: The objectives of the study will be achieved through investigating a list developed by MMS archaeologists and biologists, of potential sites that will be provided to the contractor. Test sites will be selected from among the sidescan sonar targets already supplied by industry that are suggestive of shipwrecks (currently, there are over 1,200 targets in the MMS database). The criteria for selection will include the evaluation of an acoustic image, the association of magnetic anomalies, and the report of an historic shipwreck in the target vicinity. Testing would be performed by marine archaeologists and biologists applying a variety of techniques including remote sensing, diving, underwater imagery, and ROV inspection. The projects will likely consist of extensive photographic documentation and limited excavation and artifact collection for identification purposes, as well as historical research. Biological components will be evaluated from video and still imagery with specific attention to variations between vertical and horizontal surfaces and focus on some species groups including corals and invasive species. Some limited sample collections may also be made. Similar to platforms, a known period of submergence of each wreck will be significant. These projects will not hamper the lessee's ability to develop their lease since potential targets will continue to be avoided until such time as they can be tested for significance.

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ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico
Planning Areas: Western and Central
Type: Competitive Procurement
Title: Gulf Coast Communities and the Offshore Petroleum Industry: A Comparative Community Study

Cost Range: (in thousands) \$400-\$600 **Period of Performance:** FY 2009-2011

MMS Information Needs to be Addressed: This study will support EA's and decisionmaking by providing documentation and analysis of the varied socioeconomic consequences of community involvement in the offshore petroleum industry. Because of the magnitude and broad geographic reach of onshore OCS-related activities, the complexities of separating OCS-related effects from their local contexts, and the widely differing contexts across the GOMR, MMS SIA's have tended to focus on the regional-level consequences of the program (i.e., states and multi-county/parish impact areas). However over the past two decades, concerns of Gulf States and other stakeholders have focused increasingly on local-level effects. This study will support the agency's need to analyze and predict local-level socioeconomic effects by assessing their types, scale, and the conditions under which they appear. It will enhance the Gulf's analyses of the cumulative effects of the program.

Description:

Background: The petroleum industry has been a significant feature of Gulf Coast society for over a century and the offshore industry had been significant for over 50 years. A NRC review of Gulf studies characterized this situation as a "natural laboratory" for the study of offshore's socioeconomic effects. However, the magnitude and broad geographic reach of onshore OCS-related activities, their evolution and longevity, and the widely differing local contexts in which they occur, also makes them difficult to identify and analyze, particularly at the county/parish and community level (NRC, 1992; and Luton and Cluck, 2004). In this light, the NRC criticized the Region's lack of analysis of a set of "standard" SIA topics such as demographic, fiscal, public service, and infrastructure effects—all basically local-level issues.

This study is part of the Region's plan to expand the analysis of local-level SIA effects. Earlier efforts (e.g., Kelley and Wade, 1999; Wallace, et al. 2001; Austin, et al. 2002) showed the variability of SIA-type impacts and the complex interactions between industry needs and local conditions that might generate them. For example, Hughes, et al. (2001) analyzes local conditions under which deepwater development stressed a highway corridor. Donato (2004)

shows that alternate methods of recruiting and housing immigrant labor led to differences in relationships to host communities. The Louis Berger (2003) OCS infrastructure report and the ongoing “Benefits and Burdens of OCS Deepwater Activities on Selected Communities and Local Public Institutions” have also helped to identify: (1) counties, parishes, and communities highly involved in OCS-related activities; (2) variations in the mix of activities that comprise involvement; and (3) some socioeconomic consequences of that involvement. The picture that has emerged is of great variation in the types of communities involved, the types of involvement, and the complexity of causes and effects. The range of SIA effects that might be expected has remained unclear.

This study supports Gulf efforts to address the NRC’s “standard” list of local-level SIA topics. The ongoing MMS study “Demographic Consequences of the Offshore Petroleum Industry” is providing an analysis of petroleum’s past and likely future population impacts. A FY 2007 study “State and Local-Level Fiscal Effects of the Offshore Petroleum Industry” will assess fiscal outcomes. As a companion to the fiscal study, this study will address the standard SIA list of public service and institution impacts—on education, health and welfare, public safety and fire, roads, water and sewer, electricity, and parks and recreation. Past research indicates that most (in this region of a long-lived and mature petroleum industry) of these services and institutions are not impacted the majority of the time. This study will focus on past community experiences to document when such effects have occurred, and under what circumstances. This information will allow MMS to focus its analytical efforts on the types of effects that are likely to occur in the future, and on places that may experience them.

Objectives: This study will support local-level SIA by providing a baseline description and monitoring tool of highly OCS-involved counties and parishes that emphasizes community responses and adjustments over time.

Methods: The study will identify the kinds of socioeconomic consequences that have occurred in highly involved counties and parishes; the conditions under which these consequences have occurred and are likely to occur in the future; identify the kinds of socioeconomic consequences that have occurred in highly-involved counties and parishes; identify the conditions under which these consequences have occurred and are likely to occur in the future; and, thereby help to establish a rationale for the analysis of localized effects.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Areas: Central and Western

Title: Investigation for Potential Spanish Shipwrecks in Ultra-Deepwater

MMS Information Needs to be Addressed: To date, very little historical information of colonial shipping patterns has come to light for the GOM. This study, which focuses on the discovery of historical documents pertaining to the Colonial Period, will provide the agency a greater understanding of the potential for historic shipwrecks in the ultra-deepwater of the GOM. Furthermore, the knowledge gained through this study will offer best management practices for sites located on the OCS in ultra-deepwater by supplying the MMS with an idea of what these early shipwrecks look like as they traveled through the water column and became embedded in the seafloor. Adaptive management strategies can then be used to provide protection for these sites and their associated debris fields as well as free up areas for exploratory drilling and the construction of infrastructure on the OCS.

Cost Range: (in thousands) \$400-\$600

Period of Performance: FY 2009-2010

Description:

Background: Historic shipwrecks have, to date, been discovered through oil industry sonar surveys in water depths of up to 6,500 feet. Many of these wrecks previously were not known to exist in these areas from the historic record. Taking these discoveries into account, MMS now requires archaeological survey in some deepwater areas, primarily on the approach to the Mississippi River, among those lease areas requiring archaeological investigation.

New information has come to light suggesting a higher potential for early (16th-18th century) shipwrecks in the ultra-deepwater part of the GOM (particularly in the Sigsbee Escarpment, Keathley Canyon, and Walker Ridge areas) than previously was suspected. MMS studies to date have largely discounted the presence of exploration or Colonial Period shipwrecks in significant numbers in the GOMR because of the paucity of reported shipwrecks from those periods in the secondary literature. What has not been explored thoroughly are losses associated with causes other than wrecking (such as fire, structural failure of the hull, or armed attack) that would have caused a ship to sink far from land. Since the likelihood of anyone surviving such a catastrophe at sea also diminishes considerably, the likelihood of its loss site being accurately reported is low. Generally, such ships would be reported as simply "lost at sea." Colonial Period shipwrecks in the ultra-deepwater almost exclusively would be associated with the Spanish treasure fleets leaving annually from Vera Cruz, Mexico bound for Havana, Cuba, and eventually for Spain. Hundreds of ships, laden with silver from the mines in central Mexico, made the passage to Cuba. Prevailing winds and currents in the

Gulf dictated that fleets sailed north northwest from Vera Cruz to about 26° north latitude before turning east for Florida (Figure 2). Losses of ships on this route are poorly understood.

Vessels of this period found in the ultra-deepwater of the GOM likely would be exceptionally well preserved with no disturbance from man or the mixing action of storms. Marine organisms have been found to attack and destroy wooden ships' hulls even in deepwater so that sites are likely to appear deflated. There will likely be only a slight expression of the site above the seafloor. It also may be widely scattered, if the vessel spilled its contents over a wide area in its plunge to the bottom through thousands of feet of water. As a result, these sites, which potentially are among the most historically significant shipwrecks of any in the world, will be difficult to detect and to recognize.

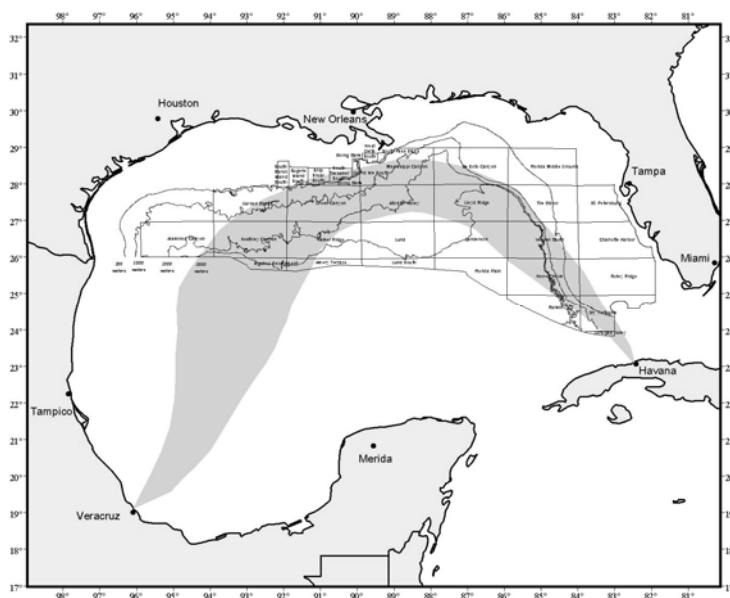


Figure 2. Route of the “New Spain Fleet” based upon contemporary charts and pilot books.

Objectives: Develop a strategy for identifying and recognizing such sites.

Methods: The study should focus on an analysis of Spanish records housed in the *Archivo General de Indias* to determine frequency of losses and potential for loss in the central and western planning areas. In addition, selected remote sensing targets located in the study area during routine industry surveys will be ground-truthed to determine their potential association with this historic period in order to characterize their physical extent, state of preservation, appearance in the remote sensing record, and potential eligibility to the National Register of Historic Places.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Areas: Central, Western

Title: Investigation of Potentially Sensitive Biological Features Surrounding Shelf-Edge Topographic Banks in the Northern Gulf of Mexico

MMS Information Needs to be Addressed: The MMS protects potentially sensitive biological features (PSBF's) in the Gulf of Mexico through NTL 2004-G05. However, the benthic and fish communities of these features are relatively unknown. Of particular concern, are multiple features known to exist in the vicinity of protected topographic features. Evidence suggests that these PSBF's support high diversity benthic communities similar to the protected banks. Significant areas of these features occur outside the bank No Activity Zones. The MMS needs to investigate these PSBF's to characterize their benthic and fish communities and define their distribution. Bathymetric data alone does not describe the quality and sensitivity of this ecosystem. This information is required to ensure that the MMS can provide protection to these valuable resources which are a significant component of the wider ecosystem. This study is designed as an adaptive approach to management and may result in revision of MMS No Activity Zone boundaries.

Cost Range: (in thousands): \$315-\$365

Period of Performance: FY 2009-2011

Description:

Background: The MMS Notice to Lessees 2004-G05 provides protection for potentially sensitive biological features (PSBF's). These are seafloor features of the Gulf of Mexico with moderate to high relief (about 8 feet or higher) that provide valuable habitat for benthic species and serve as essential fish habitat. They are not protected by the biological stipulations on leases. They provide surface area for the growth of sessile invertebrates and attract large numbers of fish. Habitat utilization of these features is expected to vary depending on physical parameters including relief, size, habitat complexity, association with other features (as in trends or systems of features), water quality, turbidity, depth, and temperature.

The MMS has become aware of PSBF's from its large database of bathymetric surveys and USGS multi-beam surveys. These features are protected from direct physical impacts of oil and gas activities based on bathymetry provided with permit applications. Knowledge of these features is limited and most of that data are not of fine enough resolution to accurately describe PSBF's. The MMS needs to characterize these features in the northern Gulf of Mexico to increase understanding and ensure protection of sensitive habitats. This study will begin that process by examining notable PSBF's known to exist near important topographic features. Recent USGS work has provided high resolution multi-beam bathymetry around

numerous shelf-edge topographic features in the northern Gulf of Mexico. In addition, the Flower Garden Banks National Marine Sanctuary (FGBNMS) has conducted several ROV surveys around a few of the banks. The FGBNMS will cooperate as a working partner on this study. They will provide their available data and experience to assist in planning the field work. They will also support the study with some funding and about a week of ship time. Other possibilities for partnerships on this study include the Gulf States Marine Fisheries Commission and NOAA's Office of Ocean Exploration.

Objectives: The objective of this study is to provide the MMS with information needed to evaluate the quality and sensitivity of known PSBF habitats near protected topographic features and relate them to the wider ecosystem.

Methods: This study will characterize both the physical and biological components of PSBF's. The study will incorporate available information for these features and conduct field investigations to gather new information. The study will focus on about four to six areas of PSBF's around protected topographic features along the edge of the GOM continental shelf from the Flower Garden Banks to Jakkula Bank. Sampling sites will be selected to produce a representative description of features in this area. Work already done by the FGBNMS will be incorporated and supplemented to maximize our results. That work includes numerous ROV surveys, mostly around the Flower Garden Banks. New information will be gathered with additional ROV surveys, water quality instrumentation, and sampling of benthic and fish components. Other methods may be employed as available and appropriate, including SCUBA, AUV, submersibles, benthic samplers, and camera systems.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Areas: Central and Eastern

Title: Long-term Effects of Oil and Gas Activities on the Mississippi–Alabama-Florida Shelf

MMS Information Needs to be Addressed: The objective of this study is to evaluate the long-term effects of oil and gas activity in the GOM by comparing data from an area where activities have been occurring for decades with an area of no activity. Historic data from the area of study would also be used to evaluate changes. This information is needed to ensure that MMS regulations continue to effectively protect the coastal, marine, and human environments.

Cost Range: (in thousands): \$2,500-\$3,000 **Period of Performance:** FY 2009-2012

Description:

Background: The oil and gas industry has been operating in the GOM since the 1940s and has expanded over about two thirds of the continental shelf. The cumulative effect of this activity on the environment should be assessed periodically to evaluate the effectiveness of ecosystem protection. Since oil and gas activity covers a broad area with about 4,000 currently operating offshore structures, it is necessary to select a representative subset for study. This study area should have a substantial history of oil and gas activity; it should be comparable to a similar reference area with no oil and gas activity; it should be an area previously studied to allow detection of change; and it should also be as free as possible of confounding effects, such as the influence of the Mississippi River plume and recurring hypoxic conditions. This study will focus on the MAFLA shelf area to meet all these requirements. The purpose of this study is to produce a current assessment of the cumulative long-term impacts of oil and gas activity in the Mississippi/Alabama shelf area, compare them to the relatively undeveloped area off the west Florida shelf, and relate that to the wider region of the GOM continental shelf.

The only substantially sized portion of the northern GOM that can provide reference sites with no history of oil and gas activity is the eastern Gulf. It is recognized that the Mississippi Delta region is not directly comparable to the Florida shelf due to differences in sediment type and sedimentation. However, the area between the delta and the Florida panhandle is very similar in sediments, water quality, and other physical conditions to the west Florida shelf. The Mississippi/Alabama shelf has a long history of oil and gas activities and has experienced increased activity over the last 30+ years. This lengthy history of oil and gas activity makes the area a suitable representative of the potential for long-term cumulative impacts. The oil and gas activity of the Mississippi/Alabama shelf is comparable to that offshore of Louisiana and Texas while the shelf area itself is comparable to the adjacent portion of the eastern Gulf near the Florida panhandle because of similar physical conditions.

The identification of long term effects related to oil and gas activity is sometimes masked by other ongoing natural variations in the environment. Impacts from oil and gas activities may not be discernable from other influences or even background conditions. Fewer confounding effects are present on the Mississippi/Alabama shelf than are found further west. The influence of the Mississippi and Atchafalaya Rivers to the west is a major obstacle to identifying anthropogenic effects. The effects of turbidity, siltation, salinity shifts, and nutrient loads from rivers are similar to potential anthropogenic stressors such as oil and gas activities. Rivers can even deliver contaminants with effects similar to those of potential contaminants from oil and gas activities. The annual summer hypoxic zone in the central and western Gulf suppresses community diversity and limits the occurrence of long-lived benthic organisms. While the Mississippi River plume has some influence to the east and other rivers are also present to the east, the effects are much less than those to the west of the area. The Mississippi plume is mostly carried to the west by water currents. Rivers to the east are much smaller and carry a much lower sediment load resulting in less turbidity. As a result, sedimentation is lower and the seafloor has less fine silt and clay, producing less turbidity from resuspension. While confounding effects will not be absent on the Mississippi/Alabama shelf, they will be much less than to the west and more comparable to the eastern Gulf.

Previous studies have examined sediments, organisms, and water in this area of the northeastern GOM. Baseline measurements along the MAFLA shelf were made during extensive studies in the mid-1970's. The general findings were that the shelf area was relatively pristine with some influence from the Mississippi discharge. Part of this area was revisited in the late 1980's during the MAMES. Portions of this historic data may or may not be useful for comparison to new data collected. Advances in instrumentation and methodology combined with poor recovery or quality control and assurance documentation for historic data may limit our ability to compare some historic data with new data. Alternatively, for those data where historical detection limits were too high to quantify contaminants, statistical methods are now available that may be used to generate default contaminant concentration estimates to substitute for nondetectable results. However, these studies will allow some historical comparison to supplement the reference sites and increase our ability to define change in the ecosystem.

The MAFLA region is perhaps the most ideal location available in the Gulf for the determination of impacts from oil and gas activities and evaluation of those effects. The history of oil and gas activities, availability of a comparable reference study area, comparatively lower confounding influences, and historic studies make the MAFLA a prime location for a current assessment of potential long-term cumulative impacts to ecosystems of the continental shelf of the GOM.

Objectives: The objective of this study is to evaluate the long-term effects of oil and gas activities on the Mississippi-Alabama continental shelf and extrapolate the results to the remainder of the GOM with consideration for regional differences.

Methods: This study will: (1) collect, analyze, and compare sediment, biological, and possibly water samples from the MAFLA shelf using appropriate techniques to evaluate

impacts; (2) determine, to the extent possible, whether there are long term measurable changes in potential indicators of contamination, including biological indicators, and if these changes can be attributed to oil and gas activities; (3) compare the results to historical studies to further evaluate the long term influences; and (4) extrapolate the impacts of oil and gas activities from the Mississippi/Alabama shelf to the remainder of the GOM continental shelf with consideration for regional differences.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Area: Gulfwide

Title: Reanalysis of Available MMS Databases for New Insights

MMS Information Needs to be Addressed: The results of this reanalysis will provide MMS with further insights into the processes that drive the circulation of the GOM and could be used in the preparation of NEPA documents, risk assessments, and design criteria for offshore structures.

Cost Range: (in thousands): \$650-\$750 **Period of Performance:** FY 2009-2011

Description:

Background: The MMS has invested millions of dollars to conduct field studies that yield extensive and high quality datasets, e.g., LATEX, DeSoto Canyon study, SCULP, Chemical Oceanography and Hydrography, Deepwater Reanalysis and Synthesis, and the recent studies of deepwater of currents across the GOM. These databases were examined relative to the objectives of the specific studies however, time and resources prevented further analyses. We believe these datasets are rich in information about processes occurring in the GOM, which could be analyzed to obtain further insights and information. Some reanalysis has been completed through the first cycle of this project and the CMI, but still much can be learned through such detailed analyses. The first round of this initiative already produced two manuscripts submitted to peer-reviewed journals, a third is nearly completed, and a fourth is entering its final phase.

Objectives: The objective of this study is to solicit from researchers ideas for reanalyzes of these datasets in order to extract the maximum possible information available. Topics of interest for these studies include, but are not limited to, effects of topography on deepwater flows, exchange of momentum between surface and lower layers, and large scale forcing of the Gulf circulation.

Methods: The data sets to be analyzed and the methods for analyzing them will be determined by the researchers. The researchers will be encouraged to make use of other published data in their analyses of MMS data as they deem appropriate and valuable.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Areas: Western, Central, and Eastern

Title: Socioeconomic Effects of the Offshore Petroleum Industry on Urban Communities

Cost Range: (in thousands) \$240-360

Period of Performance: FY 2009-2011

MMS Information Needs to be Addressed: Socioeconomic impact assessment generally addresses rural communities and past MMS studies have reflected this focus. However in the GOMR, the majority of the onshore socioeconomic effects of offshore oil have occurred in urban areas. This study will examine the effects on urban communities. The information will be incorporated in future EA's.

Description:

Background: As detailed in the findings of the MMS sponsored 2004 workshop (McKay and Nides, 2005) on socioeconomic issues for the GOMR OCS, one of the major topics was the lack of information on the socioeconomic effects of offshore oil and gas activities on urban communities. Economic and social effects of OCS activities primarily occur in urban areas. In addition, much of oil and gas related employment is also concentrated in large metropolitan areas. Despite these facts, previous MMS studies have not adequately examined how large cities and its residents are impacted by changes in the offshore petroleum industry. In general, prior MMS studies have assumed that most socioeconomic effects in large cities are diffused due to large populations and therefore are not as significant as those in small, rural communities. This study will provide some insight on the best strategy to analyze and predict socioeconomic effects of the industry in large communities.

Objectives: The objectives of this study are to:

- describe and analyze the social and economic effects of offshore oil and gas related activities in large cities in the GOMR; and
- develop a methodology that is appropriate for analyzing these effects in large cities that can be applied to other metropolitan areas in future environmental assessments and studies.

This analysis will address but will not be limited to the following issues that are particularly relevant in examining urban effects: community identity; shifts in the tax base; civic groups; real estate markets; transportation and infrastructure; public infrastructure and service strains; changes in residential and local business patterns; and schools and education.

Methods: The study area will consist of at least two major GOMR cities. Prior to August 29, 2005, New Orleans, LA and Houston, TX may have been the best cities to analyze in this

study. Although the study may compare New Orleans and Houston, the 2005 hurricane season created new issues and potential problems in basing the study strictly on these two cities. Both New Orleans and Houston have experienced unprecedented demographic, social, and economic changes due to hurricanes Katrina and Rita. The same factors that make these cities important to address (i.e., both highly involved in OCS activity, different historical, cultural, and economic ties to the offshore oil and gas industry, etc.) also make these cities difficult to study due to ongoing hurricane effects. Other major cities in the GOMR may be substituted or included if they are more methodologically feasible during the study's initial stages. The developed methodology will not only need to address complex and large urban communities, but also isolate the effects due to OCS activities from those due to the hurricanes and other ongoing changes in the environment.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Area: Gulfwide

Title: Sperm Whale Acoustic Prey Study (SWAPS)

MMS Information Needs to be addressed: The potential for acoustic disturbance resulting from seismic industry activities in the GOM is the subject of much debate. The potential effects of seismic exploration on marine vertebrates (cetaceans and sea turtles) and their prey species are largely unknown. The most recent NMFS Biological Opinions (2002, 2003) for lease sales in the GOM have included recommendations that “MMS should support investigations into the effects of seismic noise on the distribution of cephalopods and fish (i.e., sperm whale prey items) near seismic vessels, including diel vertical migration, startle effects, distribution and abundance.” The possible impacts of seismic noise on prey species (e.g. squid) are an information gap that may influence future mitigation. Before this can be addressed, methodology needs to be developed to accurately identify squid stocks in the GOM.

Cost Range: (in thousands) \$450-\$650

Period of Performance: FY 2009-2012

Description:

Background: While the potential impacts of seismic exploration on marine vertebrates are poorly understood, even less is known about seismic impacts to the marine invertebrate community. It is assumed that sperm whales are not randomly distributed within the ocean environment and are concentrated in areas with increased prey abundance. Negative impacts to prey populations may result in changes in sperm whale abundance, distribution and reproductive success. The “Cooperative Research on Sperm Whales and Their Response to Seismic Exploration in the Gulf of Mexico – (Sperm Whale Seismic Study-SWSS)” collected data on sperm whale biology, habitat use, and the possible effects of seismic airguns using a controlled exposure experiment (CEEs). While these data will add to the knowledge base of GOM sperm whale populations, they will not provide information about how sperm whale distribution is related to the relative abundance and distribution of their primary prey items (cephalopods). Squid are the primary prey item in the sperm whale diet however, previous investigations have used stomach contents and/or fecal analysis for prey determination. Cephalopods, particularly medium to large sized species/individuals, are able to avoid capture by trawl sampling due to their fast swim speeds. By using active acoustics to detect squid (developing a squid signature) large areas of the GOM could be sampled in a systematic manner. These data could then be correlated with both large scale sperm whale distributions in the Gulf as well as with the small-scale feeding movements of individual whales. It’s been suggested that when prey is abundant, sperm whales swim in more of a zig-zag pattern over small areas, while when prey is scarce they swim in more of a straight line. However, testing this is currently impossible due to the lack of information about squid stocks in the GOM.

This project would focus on developing appropriate techniques for acoustically detecting squid in the GOM and providing baseline information. Using these data, whale abundance and distribution could be correlated to prey abundance. After this has been accomplished it is expected that a follow-on project could then address direct impacts of seismic activity on prey species (cephalopods) and the sperm whale.

Objectives:

- develop an effective methodology to acoustically sample cephalopods in the GOM; and
- determine the relationship of sperm whale distribution, movement, and relative abundance to the distribution of squid prey.

Methods: Characterization of an acoustic signature for squid will be determined using a variety of acoustic techniques (e.g. echosounders, etc.). These data will then be “ground-truthed” using deepwater trawls, jig-sampling, autonomous, slow-falling camera packages or other methods. Once it has been determined that squid can be accurately detected using acoustic survey methods, squid sampling will occur in areas with sperm whales present in order to determine the potential relationship of squid prey on sperm whale distribution. If tagged whales are available, small-scale movements of individually tagged (either D-tag or S-tag; under separate funding) whales will be monitored while squid acoustic sampling occurs to determine if feeding strategies are related to prey abundance.

Revised Date: January 14, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2008-2010

Region: Gulf of Mexico

Planning Areas: Western and Central

Title: Understanding Current and Projected Gulf OCS Labor Needs

Cost Range: (in thousands) \$400-\$600

Period of Performance: FY 2009-2010

MMS Information Needs to be Addressed: Generally, labor demand is the driving issue in SIA. In the GOM, where the offshore petroleum industry is massive, long-lived, and ubiquitous but unevenly distributed, it is even more important. The industry's labor significantly shapes the baseline, that is, the region's social and economic fabric, and changes to it are one of the primary drivers of the industry's socioeconomic effects at the local and regional level. In the last two decades, it has also been undergoing rapid and significant change and the obvious links between these changes and socioeconomic consequences made it a key concern of the State of Louisiana, the industry, and many other stakeholders. Thus, a better understanding of changing labor needs, better measures of it, and associated issues will improve MMS EA's (baselines and the analysis of effects and cumulative effects) and will support MMS decisionmaking. It will also address issues important to Gulf Coast States, the industry, and other stakeholders.

Description:

Background: Understanding OCS industry-related labor demand is critical to Gulf SIA. However, this proves difficult because the industry is ubiquitous yet unevenly distributed, because it is composed of many industry sectors with varied labor demands and links to the OCS, and because existing data does not separate OCS-related labor from the rest. The first GOMR effort to address this issue (Centaur Associates, 1986) used personnel data from major oil companies. The growing role of independents and subcontracting, and the recognition of the importance of other sectors (e.g., transportation, fabrication) led to an extensive although unsuccessful attempt at a formal labor survey (ICF Consulting, LLC, n.d.). Since then, MMS has used a mix of data collection strategies in a series of more limited analytical efforts. For example, Dismukes, et al. (2003) used available data and expert opinion to develop a set of cost functions for offshore activity; Deseran and Tobin (2003) used discussions with employers to assess industry attitudes toward the changing workforce; and Donoto (2004) used formal interviews with employers and workers to describe the use of migrant labor in the fabrication industry. The ongoing studies "A Collaborative Investigation of Baseline and Scenario Information for Environmental Impact Statements" and "Gulf Coast Communities and Fabrication and Shipbuilding Industry: A Comparative Community Study" are developing labor demand information by sector, as will the planned study "An Analysis of the Oil Services Contract Industry in the Gulf of Mexico Region." None of these are redundant;

all focus on different segments of labor needs. This study will evaluate, integrate and extend these efforts.

The rapidly paced growth of energy demand and need for new energy supplies has placed increasing stress on existing production and supply capacity worldwide over a relatively short timeframe. Industry has responded but is finding that equipment, drilling rigs, infrastructure, and trained and skilled labor are all in scarce supply. In many ways, the industry is trying to react quickly while it is supported by a resource base that has been contracting since the mid-1980s. One of the most evident challenges facing the energy industry in the current run up of energy production has been in filling its significant needs for labor. Shortage types include: skilled, technical, and professional. Common industry shortages currently by job category include: welders, pipefitters, skilled supervisors, boat captains, divers, and even engineers. Shortages are common across many different sectors, including: drilling contractors; company production; ports, and supply bases; and pipeline and platform fabricators. The research is timely and supports MMS EA's.

Objectives: The overall objective is to develop a clearer, more accurate, and more detailed understanding of current labor needs of the Gulf OCS industry, projected labor needs, potential solutions to labor shortages, and the implications of needs, shortages, and solutions to the industry and Gulf communities. This study will:

- characterize important industry sectors, their labor forces, and the associated labor markets;
- analyze conditions and trends in industry sectors and the associated labor markets; and
- identify the GOM region-specific labor shortages and analyze their potential solutions.

Methods: This study will synthesize previous MMS research, but will build largely on the MMS study "Workshop on Gulf OCS Labor Needs" (LSU Center for Energy Studies) proposed for FY 2008. The LSU study will evaluate existing MMS information on labor demand and present it at a workshop comprised of MMS staff, energy economists, and appropriate industry experts. The workshop will evaluate the information by industry sector, identify gaps, prioritize them, and identify effective ways to address them. This study is planned for FY 2009 but may begin immediately after the workshop if funding is available. Specific study methods will be in large part determined by the workshop. Methods will be mixed and vary by industry sectors. To succeed, information needs must be prioritized, and some desired information will have to be forgone. For example, a labor survey might be used to collect data by region, local areas, types, categories, or industry sector but, based on past experience, surveys will be used sparingly, only for critical information and when other methods are not available. Additional sector specific workshops may follow. Finally, industry stakeholders must be involved for any method to be successful. For example, industry participants may identify additional publicly available information, make proprietary information available, and identify key experts. One possibility is the encouragement of industry to address specific issues. The study must, sector by sector, meld different methods into an integrated strategy, and preferably one that is replicable.

Revised Date: January 14, 2008

SECTION 3 TOPICAL AREAS FOR FY 2010 AND BEYOND

The GOMR is expecting a continuation of offshore oil and gas activities at its current pace. Issues that may result in future studies include industry's continued move into deepwater; air quality; gas hydrates; decommissioning; and understanding the chronic sublethal impacts associated with offshore development and production, that is, fates and effects.

3.1 Deepwater

Deepwater habitats are the least understood marine environments of the GOM. Several major deepwater studies were initiated in the recent past to broaden our limited knowledge base of deepwater benthic ecology. The results from these studies will lead to new areas for further investigation.

Several major studies are currently collecting or have recently completed measurements of currents in deepwater. Once completed, this dataset will span from DeSoto Canyon in the east to the Alaminos Canyon in the west and includes observations south of the EEZ. The next step will include modeling of the data and incorporation of the information into oil spill assessments. We will hold a workshop to discuss the results and future endeavors including additional measurements and modeling.

3.2 Fates and Effects

The OCS supports large and valuable commercial and recreational fisheries, and concern has been expressed that the oil and gas industry may contaminate these resources or the supporting ecosystem. Understanding the chronic, sublethal impacts that may be associated with offshore oil and gas activities is a concern to many. Questions continually arise as industry moves into deeper water and new technology is applied and as scientists discover increasingly subtle adverse effects resulting from pollution. The studies program is continuously addressing the information needs in this constantly evolving area and will develop new studies as the need arises

3.3 Air Quality

Currently, MMS is collecting the third Gulfwide emissions inventory. This information is used to evaluate the contributions to ozone and other pollutants to onshore communities. At some point, there may be a need to use these data to model 8-hour ozone levels, in accordance with recent regulations promulgated by the EPA.

3.4 Gas Hydrates

Exploration into the location and distribution of gas hydrates along the continental slope of the GOM is presently underway. Currently MMS is making the first assessment of hydrates as a potential economic resource in all offshore locations. While the GOM is not considered the most likely viable source of gas from hydrates, other locations, such as the Blake Plateau on the Atlantic OCS, are being considered.

3.5 Decommissioning

Over the next decade, it is expected that a large number of the over 4,000 structures in the GOM will be removed. These structures have supplied a hard surface for organisms to flourish, creating an artificial ecosystem and affecting the distribution of species. The decision to retain or remove these structures will need to be made based on the implications to the ecosystem. An initial literature search and data synthesis is currently being procured. Planned and ongoing studies will identify additional research gaps.

3.6 Alternative Energy

The Energy Policy Act of 2005 grants MMS new responsibilities over Federal offshore renewable energy and related-uses of the OCS. Under this new authority, MMS also becomes the lead Federal agency of permitting and regulatory oversight of the Cape Wind project, offshore Nantucket, Massachusetts, and any other projects already submitted to the U.S. Army Corps of Engineers. In light of this new responsibility, MMS needs to begin collecting the data and information necessary to analyze the economic impacts of these new types of projects. Several studies are being developed and will examine future alternative energy planning scenarios and alternative energy infrastructure.

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