

Offshore Environmental Studies Program

**Fiscal Years 2009 – 2011
Studies Development Plan
Pacific OCS Region**

**U.S. Department of the Interior
Minerals Management Service
Pacific OCS Region
Camarillo, CA
2008**

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SECTION 1.0 PROGRAMMATIC OVERVIEW

1.1 Introduction to the Region

The Environmental Studies Program in the Pacific Outer Continental Shelf (OCS) Region started in 1974. The Program has evolved with changes in the geographic areas of concern and study, in the emphasis of disciplines highlighted for research, and change in the status of the area from frontier to a mature producing area (pre-lease to post-lease emphasis).

Existing production and development activities on 43 producing leases offshore southern California will continue for many years. Annual production from these leases is currently about 67,000 bbls of oil per day and 100 MMCF of natural gas per day. It is expected that production from the majority of these facilities will continue for many years. The projected OCS activities section of this report fully discusses the activities anticipated on producing leases.

The need for information to regulate future renewable energy projects that may be proposed and implemented in the Pacific OCS Region is reflected in this plan. These energy projects will require studying areas outside Southern California as the interest and resource potential for wind, wave, solar and current energy facilities is throughout the Pacific Coast. For example, wave power is being tested offshore the state of Oregon and in Puget Sound.

Alternate uses of existing platforms are also being discussed. As the Region has matured, and as developed oil and gas field production has peaked and entered declines, new and innovative ideas for the use of traditional oil and gas platforms have emerged. New uses proposed for oil and gas platforms have included marine aquaculture and Liquefied Natural Gas (LNG) facilities. New or updated environmental studies will support MMS decisions with regard to such innovative and non-traditional uses of offshore facilities. The plan complements and reinforces the Environmental Studies National Strategic Plan.

This document presents a strategy for the Pacific OCS Region. It applies to the entire Region, which stretches from the United States-Mexico border to the border with Canada. It includes Hawaii, only in regards to the earliest planning for possible environmental studies related to renewable energy projects that may occur in the planning area. For FY 2009 and 2010, renewable energy studies are being proposed through the Alternate Energy Studies Development Plan. This plan focuses on the Southern California Planning Area (see map inset, figure 1.2). In future years, the regions will take an increasing role in developing appropriate studies to answer critical information needs in the other programs; potential topics for alternate use are projected for 2011.

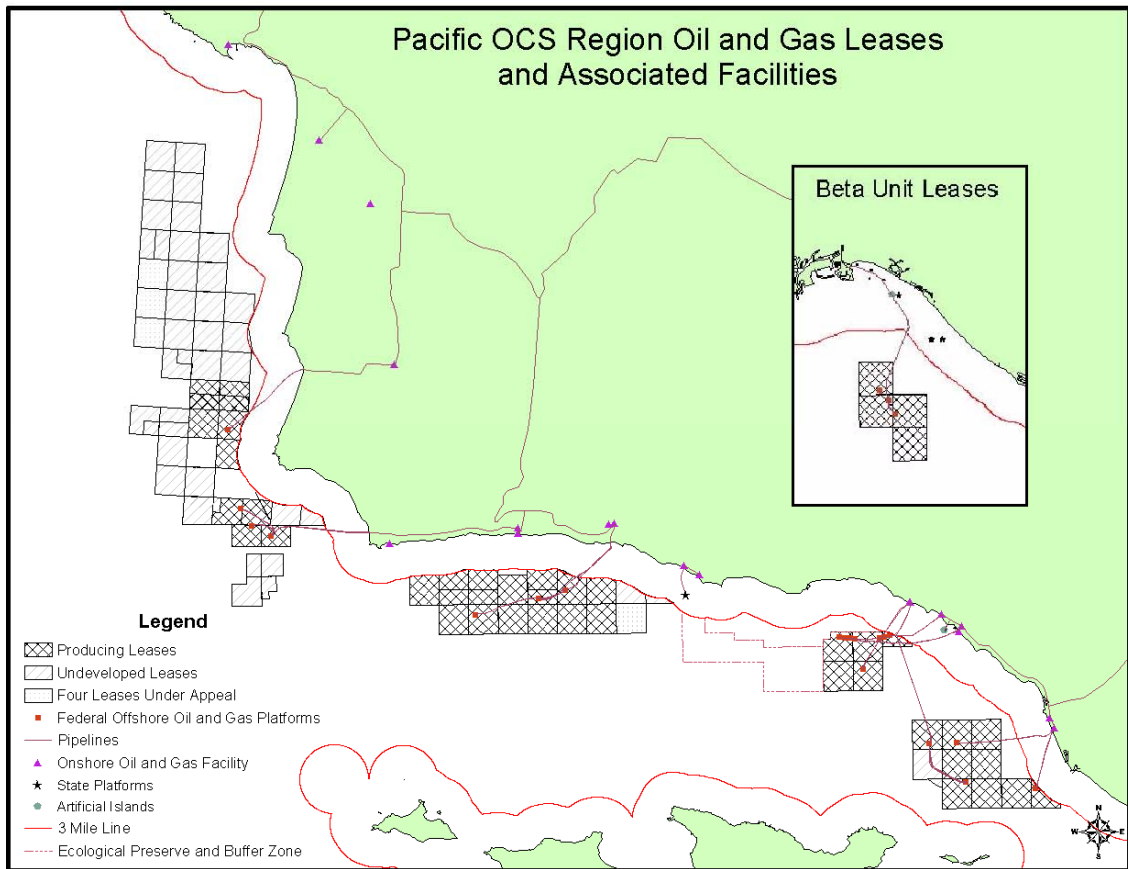
The information obtained through these studies is important and relevant to decision making. This information fulfills the following criteria:

- The study provides significant new or additional information beyond what is already known;

- The identified study is within the financial scope and time frames of the Offshore Program;
- The information provides insight into significant processes critical for understanding both natural and anthropogenic changes;
- The issue can be studied within science's present abilities or understanding of experimental methods to acquire the information.

The level of future OCS oil and gas activities and the introduction of renewable energy projects offshore the Pacific Coast will dictate changes in the strategy. Findings from current or future research may also affect the strategy and cause other avenues of research to be incorporated.

If you have any questions regarding this Pacific OCS Region Environmental Studies Development Plan, please contact Dr. Fred Piltz, Pacific OCS Region at (805) 389-7850 or Mary Elaine Helix at (805) 389-7848. You can also view the Minerals Management Service and Pacific OCS Region home pages at www.mms.gov for additional information.



1.2 Map of Active Leases

1.3 Projected OCS Activities

Prelease

No lease sales are anticipated for this planning area under the MMS Comprehensive Leasing Program for 2007 – 2012 nor are any lease sales projected for the future.

Postlease

The Southern California Planning area contains

- 43 producing oil and gas leases
- 300-400 million barrels of oil in proved reserves on existing producing leases

There are 43 producing leases in the Southern California Planning Area with 23 oil and gas platforms in Federal waters. These leases currently produce 67,000 barrels of oil per day and 100 MMCF of natural gas per day; this rate could be sustained into the next decade. Studies identified in this regional plan highlight critical information gaps and are geared to allow MMS to conduct analyses that support permitting and regulation of the oil and gas industry's ongoing production projects. Continued production at these facilities may pose new information needs during the coming decade in order to maintain environmentally safe operations with the existing infrastructure.

Studies are needed to address and monitor the environment adjacent to the existing facilities. For example, environmental studies information was used in the analysis for the replacement of a power cable to the Santa Ynez Unit (Santa Barbara Channel) offshore platforms. These platforms are electrically powered from onshore sources via a cable. The cable needed to be replaced and the MMS used recent data from environmental studies in preparing an Environmental Assessment (NEPA document) for that post lease activity.

Several alternate uses of oil and gas facilities have been proposed recently including use of an OCS facility as a receiving port for LNG.

1.4 Identification of Information Needs

The main areas of information needs fall into the following categories:

a. Supporting existing oil and gas production activities.

Biology

-- State of the Rocky Shoreline Report– A Report Card on the Health of the Rocky Intertidal Resources in the Santa Barbara Channel

MMS has been monitoring the rocky coastline adjacent to OCS oil and gas activities since 1991 and participating in a larger network of sites across the Pacific coastline for many years. This study attempts to better way to communicate the data we have been collecting to managers and the public. The proposed study builds on another effort being conducted by MARINE to define a health index to describe the health of rocky intertidal sites. The proposed study will evaluate 15 years of data from a subset of the 24 MMS-monitored sites to provide a “report-card” style report on the health of the rocky intertidal communities in the Santa Barbara Channel. This pilot will also identify potential data gaps, and other issues which hinder our ability to assign a “grade” to a site. MMS will use this information to evaluate the cumulative impact from oil and gas activities on the shoreline, and to assess impacts from new activities or accidents from the offshore program.

-- Regional Importance of OCS Oil and Gas Platforms as Rockfish Nurseries

Ecosystem-level understanding of the environment depends upon successful integration of biologic, geologic, and oceanographic information. This integration allows prediction of regional consequences from events occurring within a limited spatial scale. Such predictive capability is important in OCS permitting, mitigation, and decommissioning decisions. This study proposes to integrate sea-floor habitat maps, current flow patterns and field surveys to quantify the role oil/gas platform habitat may have in rebuilding stocks of over-fished species.

-- Distinguishing Between Human and Natural Causes of Change in Nearshore Ecosystems Using Long-term Data from DOI Monitoring Programs

Monitoring the potential effects of ongoing OCS oil and gas production on nearshore ecosystems requires an ability to distinguish between changes caused by natural processes versus those caused by human activities. This is often hampered by the lack of long-term data to describe natural variation. In southern California, two Department of the Interior monitoring programs that focus on kelp forest communities have the potential to provide considerable insight into the patterns and causes of change in kelp forest ecosystems. Analysis of these datasets (which span 25+ years) will enable scientists and managers to evaluate possible impacts from offshore oil and gas production and develop options to mitigate these impacts. This is especially important to MMS in light of global climate change and recently observed changes in the biology of the California Current system

-- Southern Sea Otter Range Expansion and Habitat Use and Interaction with Oil and Gas

Facilities

The southern sea otter (*Enhydra lutris nereis*) is exceptionally vulnerable to oil spills. This species is also listed as threatened under the Endangered Species Act. In the past five years, the southern sea otter population has significantly expanded its range down the coast of California into areas of existing oil and gas production. MMS needs to understand where and how southern sea otters are using habitat near oil and gas facilities in order to calculate risks to otters in environmental analysis of on-going OCS activities and oil spill response planning. Such information, coupled with ongoing research being done by USGS and funded by MMS, fingerprinting seep oils, would inform MMS of the possible source of oil on any otters that potentially become oiled.

-- Completion of Rockfish Assemblage Surveys around Platforms and Natural Reefs off California

The fate of spent offshore platforms off California continues to be a subject of considerable debate and 13 years of scientific surveys funded by MMS. Much of this work has been focused on the potential importance of the fish populations at offshore platforms. Except for a single platform, all of the other platforms (22) have been surveyed at least once. Knowledge of potential importance of the population at platforms to the depleted Pacific rockfish stocks has been essential for fully evaluating the various options proposed for decommissioning California's offshore oil platforms.

-- Predicting Abundance and Distribution of Seabirds and Mammals Based on Oceanographic Conditions

The study will allow MMS to refine marine mammal and seabird population estimates based on current oceanographic conditions which would aid in oil spill response, alternative energy project NEPA analyses, and evaluating decommissioning and other OCS projects.

Physical Oceanography

-- Habitat Mapping in the Santa Barbara Channel

MMS needs fine scale seafloor habitat maps in the vicinity of OCS platforms. MMS uses this information to evaluate modifications to platforms and pipelines, proposed anchoring activities and discharges, and projects which are proposed in the vicinity of OCS facilities. The information in the eastern Santa Barbara Channel is outdated or non-existent. MMS and USGS have conducted habitat mapping for deep OCS platform areas and near shallow platforms. This study will fill in the area not mapped by the two previous studies and, in addition, cover pipeline routes.

SECTION 2.0 PROPOSED STUDY PROFILES

2.1 Introduction

Study Descriptions of Ongoing Studies may be found on the web at <http://www.mms.gov/eppd/sciences/esp/profiles/pacific.htm>.

Ongoing Operations Support Studies:

Two new studies (and one study deferred from FY 2008) supporting ongoing operations are proposed for FY 2009.

State of the Rocky Shoreline Report– A Report Card on the Health of the Rocky Intertidal Resources in the Santa Barbara Channel (deferred from FY 2008)

Regional Importance of OCS Oil and Gas Platforms as Rockfish Nurseries

Habitat Mapping in the Santa Barbara Channel

2.2 Profiles of Studies Proposed for the Fiscal Year 2009 NSL

Table 1. Pacific OCS Region Studies Proposed for the Fiscal Year 2009 NSL

Page #	Discipline	Title	Rank
	HE	State of the Rocky Shoreline Report– A Report Card on the Health of the Rocky Intertidal Resources in the Santa Barbara Channel	1
10	HE	Regional Importance of OCS Oil and Gas Platforms as Rockfish Nurseries	2
12	PO	Habitat Mapping in the Santa Barbara Channel	3
AQ = Air Quality HE = Habitat and Ecology IM = Information Management SS = Social Science FE = Fates and Effects MM = Marine Mammals and Protected Species PO = Physical Oceanography			

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2009-2011

Region: Pacific OCS Region

Planning Area(s): Southern California

Title: State of the Rocky Shoreline Report– A Report Card on the Health of the Rocky Intertidal Resources in the Santa Barbara Channel

MMS Information Need(s) to be Addressed: MMS has been monitoring the rocky coastline adjacent to OCS oil and gas activities since 1991 and participating in the study of a larger network of sites across the Pacific coastline for many years. This study is aimed at finding a better way to communicate the data we have been collecting to managers and the public. Another effort currently being conducted by MARINe will identify the health indices to use in determining the health of rocky intertidal sites. The proposed study will take these indices and evaluate the 15 years of data from a subset of the 24 MMS-monitored sites to provide a “report-card” style report on the health of the rocky intertidal communities in the Santa Barbara Channel. This pilot will also identify potential data gaps, and other issues which hinder our ability to assign a “grade” to a site. MMS will use this information to evaluate the cumulative impact from oil and gas activities on the shoreline, and to assess impacts from new activities or accidents from the offshore program.

Cost Range: (in thousands) \$160 – 240

Period of Performance: FY 2009-2010

Description:

Background: Several environmental efforts are being undertaken due to the need by managers to understand the overall health of various parts of the ecosystem. This is not a trivial problem, and the reason it has not been addressed is that it is extremely difficult to identify parameters which indicate “health” in the highly complex rocky intertidal system.

Managers, however, as represented by Federal, State and local agencies on the MARINe Steering Committee continue to press toward an answer to the question so that they can make resource based decisions. This is in direct line with the mission of MARINe established in 1997 which is “to determine the health of the rocky intertidal and make this information available to the public”. MMS has been interested in developing the information in this context for several years in order to assess the health of the system adjacent to our operations and attempt to understand overall cumulative impacts to the resources.

Currently this need for information is also surfacing in many other related forums—at the Taxonomic Workshop, MARINe was asked by the State Water Quality Control Board to recommend “healthy reference sites” which could be used as controls for determining when habitats damaged by outfalls/storm runoff had returned to a “healthy” condition. The

California Resources Agency, in compliance with the Marine Life Protection Act, is in the process of setting up a system of reserves along the California coast (starting initially in an area studied by MMS) and need to know the same information so as to design proper monitoring programs for set aside reserve areas. The National Park Service (NPS) also has requested MARINE's expertise in establishing health indices for the rocky intertidal as part of a national program to assess the status of resources across their park system. MMS through MARINE has the expertise needed to develop meaningful parameters to measure the health of the sites.

MMS has consistently monitored the rocky shoreline adjacent to OCS activities since 1991 in order to understand potential direct and cumulative impacts from our activities. Substantial information has become available over the past decade which now enables scientists to attempt to evaluate the health of the rocky intertidal system. MMS PIs from our MARINE study agree that we may finally have enough information to identify health indices. An expert panel is made up of intertidal scientists and scientists familiar with developing health indices for other resources has volunteered their time to develop the indices; once developed, these parameters can be used to analyze the data from our sites to determine their overall health and ranking.

Objectives: To use identified health indices developed by MARINE to evaluate data from long term monitoring program site in order to rank the health of MMS- monitored sites in "report card" fashion.

Methods: Trend data and biodiversity data collected at MMS-funded sites, and housed either in the MARINE database or in the PISCO database, will be evaluated to determine the health of the sites in relation to the identified indices. It is expected that the health indices will consider various scientific measurements of biodiversity and robustness of the resources will be considered along with known natural variation along the coast due to physical variables such as exposure, slope, substrate, usage, sand intrusion, etc.

This pilot report will focus on MMS monitored sites in the Santa Barbara Channel/Santa Maria Basin and the corresponding NPS sites on the Channel Islands where we have the longest dataset so a direct comparison can be made between mainland and island sites. A summarized "report card" would be released to the public; an attached, more detailed report would be released for local, state and federal government managers. This report will become a model for future state-wide reports.

Peer review will be built into the development of this report to ensure there is a consensus among experts as to the validity of the rankings. It is anticipated that this peer group will be subset from MARINE with its 40 partners and will contain Sanctuary managers, Park managers, State managers and scientists so that the report strikes a balance between scientific and management goals to maximize its use in public coastal management programs.

Revised Date: April 1, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan 2009-2011

Region: Pacific OCS Region

Planning Area: Southern California

Title: Regional Importance of OCS Oil and Gas Platforms as Rockfish Nurseries

MMS Information Need(s) to be Addressed: Ecosystem-level understanding of the environment depends upon successful integration of biologic, geologic, and oceanographic information. This integration allows prediction of regional consequences from events occurring within a limited spatial scale. Such predictive capability is important in OCS permitting, mitigation, and decommissioning decisions. This study proposes to integrate sea-floor habitat maps, current flow patterns and field surveys to quantify the role oil/gas platform habitat may have in rebuilding stocks of over-fished species. Currently, shallow habitats of OCS oil/gas platforms host large numbers of economically important juvenile species, especially rockfishes. MMS will need to make decisions in future years about the environmental impacts of platform decommissioning options. The knowledge gained from this study will allow MMS to address concerns raised in the University of California Blue Ribbon Science Panel on Decommissioning about the contribution of oil and gas platforms to regional fish stocks.

Cost Range: (in thousands): \$400-\$550 **Period of Performance:** FY 2009 - 2012

Description:

Background: To obtain an ecosystem-level understanding of the OCS, biological and physical databases must be integrated. With the completion of recent and ongoing MMS region-wide oceanographic and geologic surveys, it is time to link and expand biological surveys to match the spatial scale of these physical databases. Such integration will be important to all aspects of permitting, mitigation and decommissioning decisions of the OCS.

For example, future Pacific OCS decommissioning decisions will rely in part on the relative importance of shallow water platform habitat as nurseries to commercially-important rockfish species as compared to natural reefs within the region. The majority of marine species at oil platforms and natural reefs do not reside in these habitats for their entire life. Population connectivity within and among habitats varies according to the life history of each species, oceanographic patterns, and distribution of hard bottom. One consequence of a spatially complex life history is that impacts of a reefed platform may propagate across regions and habitats and affect other populations. Therefore, understanding and integration of physical and biological connectivity processes must precede predictions regarding the environmental consequences of platform decommissioning alternatives. We now have sufficient knowledge to address these large scale questions. MMS information needs thus include establishing how

the removal of such habitat will impact regional environments.

This study is one of a series of rockfish studies in the POCS. Previously, MMS funded the study *Assessing the Fate of Juvenile Rockfish at Offshore Platforms and Natural Reefs in the Santa Barbara Channel* NSL PC-04-02, which performed a longitudinal study on the fate of juvenile rockfish if platforms were not present. During FYs 2008-2011, MMS will support the study *Spatial and Seasonal Variation in the Biomass and Size Distribution of Juvenile Fishes Associated with a Petroleum Platform off the California Coast*, which will use a hydroacoustic array to collect fine-scale data on the abundance and species composition of juvenile fishes recruiting to one platform. Using the GIS, this proposed study will extrapolate this fine-scale information across the regional scale. To accomplish this, new field data has to be collected across a regional scale concurrently with the above study (recruitment in spring of 2009 and/or 2010) because of the annual nature of juvenile rockfish recruitment. The proposed study represents a critical next step in a coordinated program that extends local scale studies across the entire region of interest to OCS activities.

Objectives: The overall objective of this study is to provide begin to integrate region-wide oceanographic, geologic, and biologic data on the POCS so MMS with initial elements of an ecosystem-level synthesis of the marine environment on which to base management decisions. The initial efforts in applying this synthesis will focus on understanding the regional importance of platform habitat as rockfish nurseries in order to predict consequences of decommissioning to EFH and managed fish species.

Methods: 1) The contractor will update an MMS - USGS geographical information system (GIS) with new seafloor habitat, temperature, and bathymetry information; 2) Using information in the scientific literature on abundance distribution of life history stages (juvenile and adult) in relation to physical parameters, a series of “potential habitat” layers will be generated for each species of interest and incorporated into the GIS; 3) Using standard scuba protocols, a field survey will be conducted to assess the absolute biomass/stock of juvenile rockfishes that inhabit shallow water habitats (both natural reefs and platforms) within the Santa Barbara Channel region. The scuba survey will, for the first time on the Pacific coast, use a randomized, stratified, and geo-referenced survey design that allows for statistical inference across the region; 4) the GIS will use region-wide patterns of surface currents and potential habitat layers for two overfished species, lingcod and bocaccio, that have pelagic larvae which reside in the upper water column, and generate “connectivity envelopes” across areas of interest (Santa Barbara Channel region and San Pedro Basin) that outline likely pathways of larval transport, and potential juvenile-adult migration patterns. Connectivity envelopes for adult-pelagic larvae stages are constructed using larval duration periods combined with seasonal current vectors and overlaid onto potential habitat layers. Possible juvenile-adult migration patterns will be identified by potential habitat layers of each stage and distance to nearest habitat patches. In both types of analyses, platform-natural reef links will be featured.

Revised Date: March 19, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2009–2011

Region: Pacific Region

Planning Area(s): Southern California

Title: Habitat Mapping in the Santa Barbara Channel

MMS Information Need(s) to be Addressed: MMS needs fine scale seafloor habitat maps in the vicinity of OCS platforms. MMS uses this information to evaluate modifications to platforms and pipelines, proposed anchoring activities and discharges, and projects which are proposed in the vicinity of OCS facilities. The information in the eastern Santa Barbara Channel is outdated or non-existent. MMS and USGS have conducted habitat mapping for deep OCS platform areas and near shallow platforms. This study will fill in the area not mapped by the two previous studies and, in addition, cover pipeline and power cable routes. This study supports the West Coast Governors Agreement on Ocean Health Strategic Plan to which the Department of the Interior is a Federal co-lead.

Cost Range: (in thousands) \$225K - \$300K **Period of Performance:** FY 2009-2010

Description:

Background: Except for the data collected recently by MMS in an Interagency Agreement with USGS, the basic geologic information in the eastern Santa Barbara Channel is especially outdated or non-existent, and habitat mapping has not been done. However, this area is an active area for potential projects and for modifications to older oil and gas facilities and so the need for broad information is high. MMS requires the operators to conduct site specific surveys of their pipeline routes if they propose a modification to their pipeline in accordance with Notice to Lessees (NTL's). However, the broader information which MMS requires in order to review other OCS projects not covered by the NTL is not available. This includes; evaluate OCS operations in context with the regional environment, assess the rarity of hard bottom sensitive habitat, evaluate decommissioning alternatives, and examine other projects proposed in the same general area as OCS facilities (such as LNG or mariculture projects) is not available. MMS and USGS through a 2004 IA, conducted habitat mapping along two zones, one for deep OCS platform areas and one for nearshore shallow platforms. This study will fill in the area between the two studies for a complete mapping of the eastern Santa Barbara Channel, an area with 17 OCS production facilities.

These data advance the West Coast Governor's Agreement on Ocean Health State/Federal initiative to map the area off California for use in making decisions about offshore alternative energy projects and Marine Protected Areas. NOAA/MBARI has mapped the deeper western channel over the past year. In combination with the work completed recently by MMS and USGS, this project will complete mapping of the Santa Barbara Channel. These data in other areas were used to accurately map individual tar seep "volcanoes" so that samples of oil could

be collected for fingerprinting.

Objectives: The objective of the study is to map benthic habitats in the Eastern Santa Barbara Channel in an area not previously mapped or where the maps are outdated. Types of benthic habitats of interest to MMS include long-lived high relief rocky reef habitats characterized by large sponges and corals; white abalone habitat; and rock fish habitats.

Methods: The project includes a multibeam high resolution sonar survey followed by a towed camera survey along prescribed transect lines to maximize characterization of identified multibeam textures. Protocols will be the same as recent surveys. A benthic biologist participating in the towed camera survey enters descriptive biological data (species identified in the photos in categories) in the field and in the lab characterizing the habitat along the transect lines. Resolution parameters, metadata requirements and quality will follow Federal guidelines.

All of the data is analyzed in the lab so that the areal extent of a given habitat identified in the transect can be interpolated across the identified multibeam texture.

Revised Date: April 1, 2008

2.3 Profiles of Studies Proposed for the Fiscal Year 2010 NSL

Table 2. Pacific OCS Region Studies Proposed for the Fiscal Year 2010 NSL

Page #	Discipline	Title
15	HE	Distinguishing Between Human and Natural Causes of Change in Nearshore Ecosystems Using Long-term Data from DOI Monitoring Programs
18	MM	Southern Sea Otter Range Expansion and Habitat Use and Interaction with Oil and Gas Facilities
20	HE	Completion of Rockfish Assemblage Surveys around Platforms and Natural Reefs off California
22	MM	Predicting Abundance and Distribution of Seabirds and Mammals Based on Oceanographic Conditions *
AQ = Air Quality FE = Fates & Effects HE = Habitat & Ecology IM = Information Management MM = Marine Mammals & Protected Species PO = Physical Oceanography SS = Social Science * Targets USGS funding (BRD)		

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2009-2011

Region: Pacific OCS Region

Planning Area: Southern California

Title: Distinguishing Between Human and Natural Causes of Change in Nearshore Ecosystems Using Long-term Data from DOI Monitoring Programs

MMS Information Need(s) to be Addressed: Monitoring the potential effects of ongoing OCS oil and gas production on nearshore ecosystems requires an ability to distinguish between changes caused by natural processes versus those caused by human activities. This is often hampered by the lack of long-term data to describe natural variation. In southern California, two Department of the Interior monitoring programs that focus on kelp forest communities have the potential to provide considerable insight into the patterns and causes of change in kelp forest ecosystems. Analysis of these datasets (which span 25+ years) will enable scientists and managers to evaluate possible impacts from offshore oil and gas production and develop options to mitigate these impacts. This is especially important to MMS in light of global climate change and recently observed changes in the biology of the California Current system

Cost Range: (in thousands) \$200 – \$250 Period of Performance: FY 2010-2012

Description:

Background: Due to the inherent connectivity of the marine environment, a number of activities related to outer continental shelf (OCS) oil and gas production can adversely affect nearshore habitats. These activities are: (1) alteration of habitat through the installation, maintenance, and/or removal of platforms, pipelines, cables, and other structures, (2) release of contaminants into the marine environment by oil spills and discharges (3) decreased water quality via sediment disturbance during anchoring, dredging, etc., and (4) onshore activities that result in erosion or spillage into the nearshore environment.

However, the broader information which MMS requires in order to review other OCS projects not covered by the NTL is not available. This includes; evaluate OCS operations in context with the regional environment, assess the rarity of hard bottom sensitive habitat, evaluate decommissioning alternatives, and examine other projects proposed in the same general area as OCS facilities (such as LNG or mariculture projects) is not available. Understanding the natural dynamics of nearshore ecosystems requires comprehensive long-term data that span a wide range of environmental conditions in areas potentially impacted by OCS oil and gas activities. Such data exist for kelp forest communities that occur at offshore islands in southern California, which are monitored regularly by two Department of the Interior Bureaus (U.S. Geological Survey and National Park Service). Unfortunately, a lack of funding and staff for analyses have caused these data to be under utilized, yet they have an enormous

potential to aid in assessing potential impacts of OCS related activities on giant kelp forest communities.

Giant kelp forests are among the most productive ecosystems in the world and their complex structure provides food and habitat for a diverse array of ecologically and economically important species. As such, these systems have been designated habitat areas of particular concern (a subset of essential fish habitat) for groundfish by the Pacific Fisheries Management Council and as environmentally sensitive habitats by the State of California. Attributing change in kelp forest systems to human activities, however, can be difficult because kelp forests undergo large and abrupt fluctuations in size and species composition in response to a variety of predictable (e.g., seasonal) and unpredictable (e.g., disease, large waves) natural events. Most of work done to date on the causes of community change in kelp forests has come from relatively short-term investigations of a few interacting species. Longer-term studies that encompass the wide range of environmental conditions experienced by kelp forests are uncommon and those that exist have tended to focus on a single species or guild. More detailed community analyses involving long-term data are needed to improve our understanding of the causes and consequences of change in giant kelp forest ecosystems. In addition, identification of patterns in these datasets will aid in predicting potential ecosystem impacts due to climate change and in advancing science-based management, both of which are goals central to DOI stewardship responsibilities and trust resources.

Objectives: Long-term data on the kelp forest communities of San Nicolas Island and the Channel Islands National Park will be combined and analyzed to determine: (1) the influence of short and long-term climate oscillations (ranging from seasons, to years [e.g., El Niño-Southern Oscillation] to decadal scales (e.g. Pacific Decadal Oscillation)) on the abundance, species composition, and trophic structure of kelp forest communities, (2) resilience of the community to varying levels of natural disturbance and (3) the periodicity (and, if possible, causes) in shifts of community state. Anticipated products for the proposed work include peer-reviewed scientific publications, compiled data and metadata that are archived in an accessible format that will facilitate future syntheses and a number of reports and science summaries. The ultimate goal is to understand the natural range and sources of variability in the kelp forest ecosystem well enough to accurately predict how it will respond to environmental change and to enable scientists and managers to evaluate possible impacts from offshore oil and gas production and develop options to mitigate these impacts.

Methods: Funds will support the analysis of existing data collected by the United States Geological Survey (USGS) and National Park Service (NPS). The USGS has been collecting data on the abundance of macroalgae, benthic invertebrates and fishes in fixed transects at six kelp forest sites around San Nicolas Island twice annually since 1980. Monitoring activities also include following the survivorship and growth of all giant kelp plants at the study sites during this time period. The NPS has been collecting similar data at 16 sites on the five Islands in the Channel Islands National Park (Santa Barbara, Anacapa, Santa Cruz, Santa Rosa, and San Miguel) since 1982. These two databases are very compatible in terms of their content, time period, and methods of data collection. The general approach will be to conduct detailed comparative time series analyses. Importantly, both data sets encompass two of the largest El Niño events ever recorded (1982-83 and 1997-98). Moreover, differences in

environmental conditions among islands and among sites within islands (owing to different current regimes and exposures) provide a wide range of environmental conditions over which natural changes in kelp forest communities can be assessed.

Revised date: April 1, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan 2009-2011

Region: Pacific OCS Region

Planning Area: Southern California

Title: Southern Sea Otter Range Expansion and Habitat Use and Interaction with Oil and Gas Facilities

MMS Information Need(s) to be Addressed:

The southern sea otter (*Enhydra lutris nereis*) is exceptionally vulnerable to oil spills. This species is also listed as threatened under the Endangered Species Act. In the past five years, the southern sea otter population has significantly expanded its range down the coast of California into areas of existing oil and gas production. MMS needs to understand where and how southern sea otters are using habitat near oil and gas facilities in order to calculate risks to otters in environmental analysis of on-going OCS activities and oil spill response planning. Such information, coupled with ongoing research being done by USGS and funded by MMS, fingerprinting seep oils, would inform MMS of the possible source of oil on any otters that potentially become oiled.

Cost Range (in thousands): \$300-400K
FY 2010 - 2012

Period of Performance:

Description:

Background: The southern sea otter was listed as threatened primarily because of its small population size and the risk of oil spills. Since listing, the southern sea otter population has gradually increased its size and range. Approximately 2,800 sea otters now inhabit the coastline from Half Moon Bay to Santa Barbara. Within the past five years, about 100 sea otters have been routinely observed in the Point Conception area, adjacent to active oil and gas facilities and natural oil and gas seeps. Very little is known about their daily activity patterns and habitat use in this area.

Objectives: Research objectives include 1) identification of important sea otter resting and foraging areas adjacent to oil and gas facilities; 2) delineation of movement patterns along the southern California coast; and, 3) assessment of sea otter distribution and behavior in the vicinity of natural oil and gas seep areas (e.g., Coal Oil Point, Santa Barbara County).

Methods: Up to 20 sea otters per year will be captured on the southern California coast over a two year period. Each animal will be implanted with a VHF radio tag and a time-depth-recorder using well established techniques developed by the U.S. Fish and Wildlife Service and the U.S. Geological Survey. Geospatial tags may be considered and used if they are developed and approved for use in sea otters by the time this study is initiated. These movement data would be correlated to the location of known seeps in the Santa Barbara Channel and correlations to possible oiling estimated.

Tagged animals will be tracked for a two year period from land and air on a weekly basis with

periodic intensive survey periods designed to determine daily movement and activity patterns in relationship to oil and gas facilities and naturally occurring oil seeps. In the third year of the project, some of the tagged sea otters will be recaptured to recover their time-depth-recorders for more detailed analysis of their activity patterns.

Revised date: April 1, 2008

ENVIRONMENTAL STUDIES PROIGRAM: Studies Development Plan 2009-2011

Region: Pacific OCS Region

Planning Area: Southern California

Title: Completion of Rockfish Assemblage Surveys around Platforms and Natural Reefs off California

MMS Information Need(s) to be Addressed: The fate of spent offshore platforms off California continues to be a subject of considerable debate and 13 years of scientific surveys funded by MMS. Much of this work has been focused on the potential importance of the fish populations at offshore platforms. Except for a single platform, all of the other platforms (22) have been surveyed at least once. Knowledge of potential importance of the population at platforms to the depleted Pacific rockfish stocks has been essential for fully evaluating the various options proposed for decommissioning California's offshore oil platforms.

Cost Range (in thousands): \$700-850K

Period of Performance: FY 2010 - 2011

Potential partial funding from CARE (\$50K)

Description:

Background: It is recognized that knowledge of fish assemblages inhabiting OCS facilities is fundamental to determining the effects of decommissioning on fish populations. Since 1995 the U.S. Geological Survey, the Minerals Management Service, and most recently the California Artificial Reef Enhancement Program (CARE), have provided funding to conduct research on the fishes that live around the platforms and on natural rock outcrops of Central and southern California. The goal of this research is to determine the patterns of fish assemblages around both platforms and natural reefs. A major synthesis of this work was published in 2003 and has been well received. Except for a single platform, all other platforms have been surveyed at least once, with a few platforms surveyed annually during the past 13 years of research. The Interagency Decommissioning Working Group and the Pacific Region recommend that MMS complete this long-term study project through the 15-year mark. This 2-year effort will thus add to the overall research effort and conclude 1.5 decades of surveys and analyses. Data gaps may continue to exist, but may be approached on a case-by-case basis when decommissioning is proposed for individual structures. This research involves broad scale surveys at numerous oil/gas platforms and natural reefs. When complete, this long-term data set will provide the foundational information of regional populations so that MMS can specify requirements and/or additional surveys to industry or other interested parties when they propose decommissioning.

Objectives: Research objectives include 1) characterizing the fish assemblages around platforms where data is limited or non-existent and on nearby natural reefs, and 2) describing the spatial and temporal patterns of fish diversity, density and size distribution among habitat

types.

Methods: A multiple-year fish survey of platforms and nearby natural outcrops concentrating on geographic areas where data is non-existent or limited.

At Platforms and Natural Outcrops within SCUBA Depth:

- 1) Conduct scuba surveys of the upper 30 m of these platforms, along with surveys of relatively shallow natural outcrops.

At Platforms and Natural Outcrops below SCUBA Depth:

- 1) Conduct fish surveys using the *Delta* submersible, a 4.6 m, 2-person vessel, operated by Delta Oceanographics of Oxnard, California along belt transects about two meters from the substrata. 2) Make transects around the bottom of the platform and around each set of horizontal cross beams up to a depth of approximately 30 m (100 ft) below the surface. 3) Conduct belt transects to sample the shell mounds and natural rock outcrops. During all transects document (1) species (if known); (2) estimated total length; (3) the habitat it occupied (e.g., rock, sand, mud, cobble, boulder); (4) its position relative to the substrate (e.g., in crevice, on reef crest, on slope, above structure); and (5) the distance of the fish from that substrate.

Revised date: January 7, 2008

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2009-2011

Region: Pacific OCS Region

Planning Area: Southern California

Title: Predicting Abundance and Distribution of Seabirds and Mammals Based on Oceanographic Conditions

MMS Information Need(s) to be addressed: The study will allow MMS to refine marine mammal and seabird population estimates based on current oceanographic conditions which would aid in oil spill response, alternative energy project NEPA analyses, and evaluating decommissioning and other OCS projects.

Cost Range: (in thousands) \$150-225

Period of Performance: FY 2010–2012

Description:

Background: Recent reports by the U. S. Commission on Ocean Policy and the Pew Oceans Commission have stressed the importance of using an ecosystem-based approach to manage ocean resources, as well as to support a national research and monitoring strategy.

USGS/MMS monitoring work in coastal waters off southern California has focused on the extensive populations of resident breeding and non-resident migratory seabirds and marine mammals in this dynamic ecosystem. The islands provide breeding habitat for some of the largest seabird breeding colonies in California and some of the largest pinniped colonies in North America (Carter *et al.* 1992, Bonnell and Dailey 1993). Variation in the southern California Current has forced dramatic fluctuations in regional oceanographic conditions (Roemmich and McGowan 1995) that have altered zooplankton composition and fish abundance (Moser *et al.* 2000). However, very little is known about how fluctuating ocean conditions affect seabirds and marine mammals.

During 1999–2002, the U.S. Geological Survey (USGS) and Humboldt State University in cooperation with MMS (Mason *et al.* 2004) collected extensive aerial survey data for seabirds and marine mammals off southern California. Observers flew >55,000 km, counted >485,000 seabirds and >64,000 marine mammals, and identified 67 seabird and 19 marine mammal species. Results from the study suggested that distribution of many birds and mammals correspond to locations with unique variability in oceanographic structure (i.e., thermal water masses, frontal regions, ocean basins, etc.). In addition, recent studies show that oil platforms provide recruitment habitat for invertebrates and fish (Love *et al.* 1999, Love *et al.* 2000, Casselle *et al.* 2002, Soldal *et al.* 2002, Jorgensen *et al.* 2002, Lokkeborg *et al.* 2002). Upper-trophic-level predators such as seabirds may rely on prey resources affiliated with these structures (Weise *et al.* 2001, Adams and Takekawa *in review*).

Quantitative information is lacking but is needed to predict how changing ocean conditions (i.e., sea surface temperature, chlorophyll concentration) will modify the distribution and abundance of wildlife species in this region. Anthropogenic threats including climate change may greatly alter the distribution of current wildlife and fisheries resources, confounding our understanding of potential changes caused by individual projects or management actions. Thus, in this study, recent wildlife distributional datasets combined with oceanographic habitat features in stochastic analytical models will be used to predict occurrence and abundance of seabirds and marine mammals off southern California.

Objectives: Evaluate data from previous MMS/USGS marine mammal and seabird surveys in relation to with habitat data as described in satellite remote sensing and bathymetry data in order to:

1. Examine habitat relationships that can be used to predict species' distributions and refine population estimates.
2. Understand the relationship between specific oceanographic processes and features, such as upwelling, fronts, eddies, bathymetry and the distribution, abundance, and species composition of the primary marine mammal and seabird prey.

This information and modeling would be used to predict marine mammal and seabird distributions directly from oceanographic parameters and patterns.

Methods. Models will be combined with geographic information systems (GIS) to examine spatial and temporal patterns in the distribution and habitat utilization of select seabirds detected on surveys throughout the southern California Bight, 1999–2002. Specifically, the study will examine how fixed abiotic features (e.g., colony location, bathymetric features, etc.) and dynamic oceanographic parameters (e.g., SST, ocean color, fronts, Beaufort sea-state) affect seabird distribution and detection probabilities. This work builds on techniques and methods that have been developed for analyzing single species' habitat associations using aerial VHF telemetry, and at-sea habitats measured using satellite remote sensing. Probabilities in turn will be mapped and presented as continuous surfaces in a GIS

Revised Date: **April 5, 2007**

SECTION 3.0 TOPICAL AREAS FOR YEARS 2011

Alternative Energy and Alternate Use

Offshore wind and wave energy may supplement oil and gas supplies and provide a renewable energy source. Studies will be needed to assess new technology offshore California, Oregon, and Washington, identify suitable areas and conditions, and examine regional environmental effects. Possible needs include a Northwest based CMI, workshops, and bird surveys.

Habitat Value of Platforms and Rigs to Reefs

Currently, energy companies are obligated to remove the platforms and the shell mounds that have developed around Pacific OCS platforms; however, there is considerable interest from the State of California and some user groups to allow all or some of each platform to remain because of their value as habitat to overfished rockfish species. Based on MMS scientific study to date, the State of California is considering a program to allow this on a case-by-case basis. The MMS position and decision-making on this issue should continue to be supported by further scientific study into the habitat value and importance of platforms on a regional scale.

Assessment of Cut-off Options for Rigs to Reefs

MMS needs to understand the impacts to the biology and overall habitat value from cutting the platform off at different depths below the seafloor. This issue is raised at any meeting or conference as an information need by MMS, scientists and the state.

Contribution to Stock

Once studies have been completed which describe the fish assemblages around OCS platforms and pipelines, estimates of their contribution to fish stock will need to be made in order to assess the impact of decommissioning.

Synthesis and Conclusion from 15 years of Platform Surveys

Once the 15 years of fish survey studies have been done at platforms and natural reefs, there should be a focused effort, perhaps a book, to synthesize the collected information within a regional context. This effort should include a time-length overview description of the fish assemblages around OCS platforms, trends over time, estimate of the contribution to fish stocks, estimate of importance to Pacific fisheries, observations pertaining to the influence of short and long-term climate oscillations (El Nino-Southern Oscillation, Pacific Decadal Oscillation, etc.), physical oceanography, and distribution of benthic habitat types. When complete, this synthesis would integrate 15 years of foundational survey information, as well as information from many other MMS-funded studies in oceanography and geology, and provide a good understanding of regional populations so that MMS can identify specific requirements and/or additional surveys for industry projects when they propose decommissioning. Furthermore, this synthesis would stand as a major contribution in the field of artificial reef science, and therefore applicable to address information needs among all OCS regions.

SECTION 4.0 LITERATURE CITED

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