Offshore Environmental Studies Program

Fiscal Years 2010-2012 Studies Development Plan

Pacific OCS Region

U.S. Department of the Interior
Minerals Management Service
Pacific OCS Region
Camarillo, CA
2009

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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 63,000 bbls of oil per day and 130 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 and wave energy facilities are throughout the Pacific Coast. For example, wave power is being tested offshore the state of Oregon and northeast Washington (Makah).

Alternate uses of existing platforms have been 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 previously 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 2010 and 2011, 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 2012.

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 time frames of the Offshore Program;

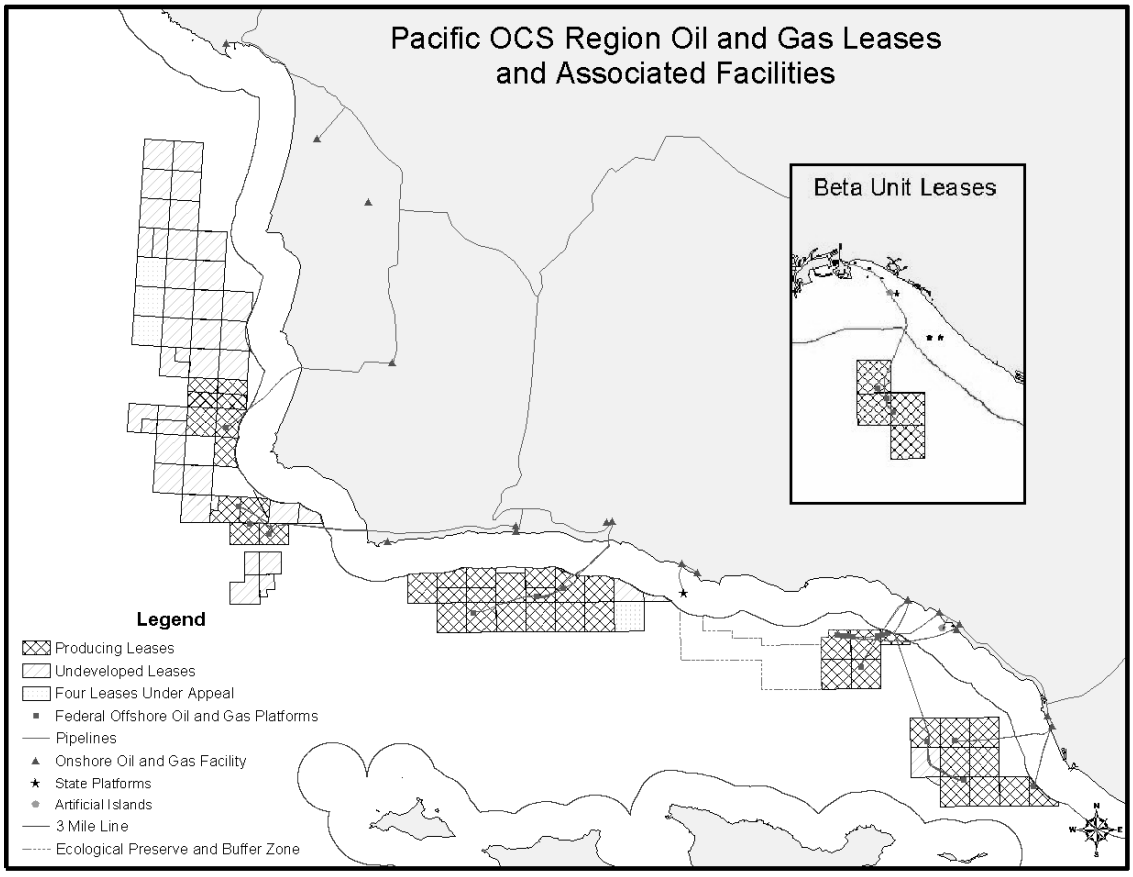
- The information provides insight into significant processes critical for understanding both natural and anthropogenic changes;

- The issue can be studied within science's present abilities or understanding of experimental methods to acquire the information.

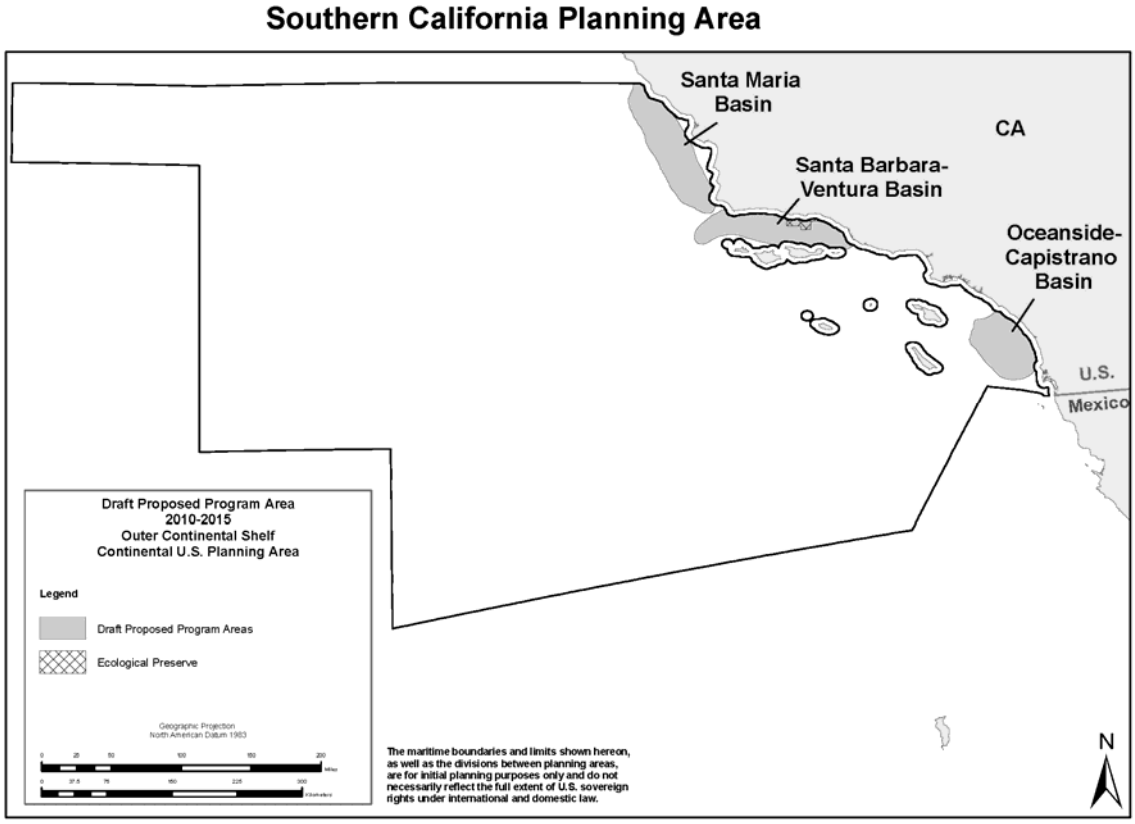
The level of future OCS oil and gas activities and the introduction of renewable energy projects offshore the Pacific Coast will dictate changes in the strategy. Findings from current or future research may also affect the strategy and cause other avenues of research to be incorporated.

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. You can also view the Minerals Management Service and Pacific OCS Region home pages at www.mms.gov for additional information.

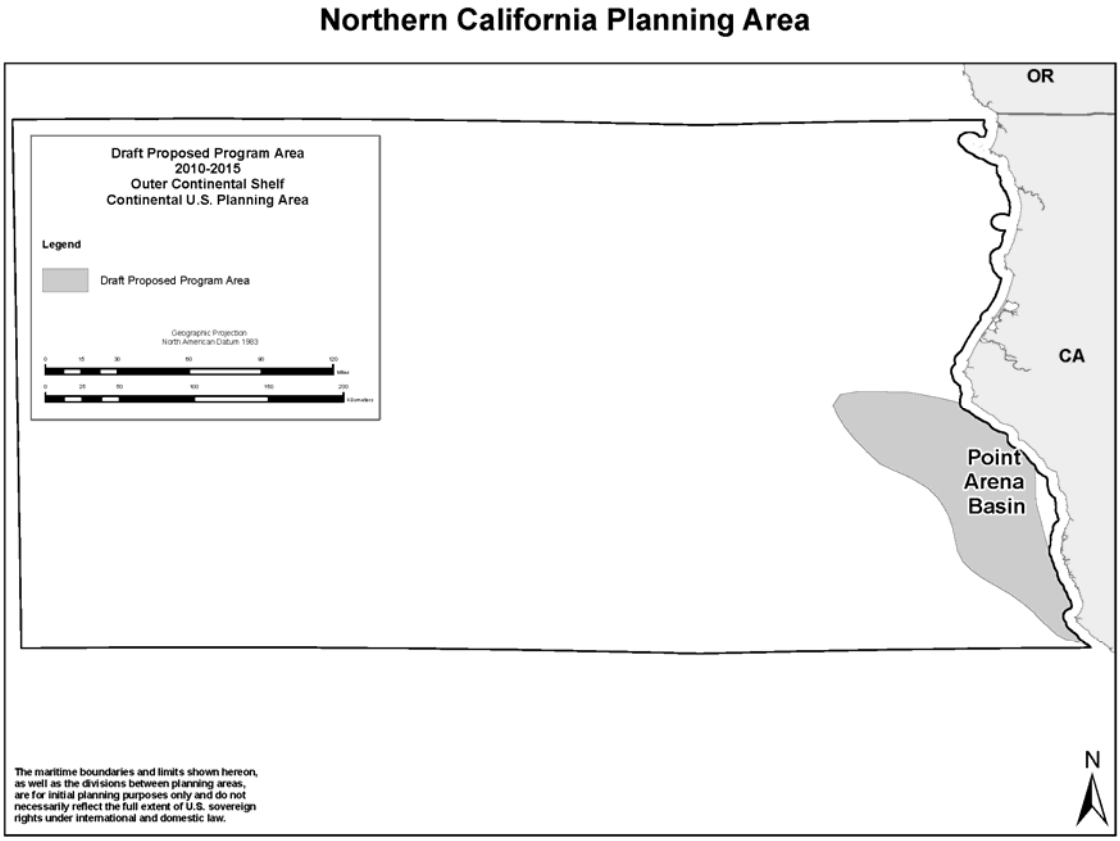
1.2 Map of the Pacific OCS Region Active Leases – Southern California



1.2.1 Map of Southern California Planning Area



1.2.2 Map of Northern California Planning Area



1.3 Projected OCS Activities

Prelease

No lease sales are anticipated for this planning area under the MMS Comprehensive Leasing Program for 2007 – 2012. The initial stages of developing a new Five Year Comprehensive Leasing Program for 2010 – 2015 have been initiated. The Proposed Notices for this program were published in the Federal Register in January 2009 and include geographically limited lease sales for Southern California and Northern California. This Studies Development Plan includes several studies that will serve to provide information to support the new Comprehensive Leasing Plan for these planning areas.

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 63,000 barrels of oil per day and 130 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 new oil and gas leasing, exploration, and production activities.

Biology

Descriptions of benthic communities for the Point Arena Basin, Northern CA are needed for NEPA analyses because there are insufficient detailed data for waters deeper than SCUBA depths. This area is poorly described with regard to seafloor habitats and biological communities. Data generated will be used for environmental review of projects proposed in the area, including the proposed lease sale off Fort Bragg and for future alternative energy projects in the region.

The studies proposed below as supporting existing oil and gas production activities will also serve to support lease sale and alternative energy activities proposed for the Southern California Planning Area. The fish – platform oriented studies proposed provide a regional perspective on the role new oil and gas facilities can play in the regional ecology of important fish resources. Similarly, the completion of the invertebrate surveys of platforms in the region provides such a perspective. The MARINe proposed efforts additionally provide the regional perspective and long term trends perspective against which to assess potential effects of new oil and gas and alternative energy activities in the planning area. The Sea Otter study will result in up to date analyses for any potential new lease sales and subsequent activities.

b. Supporting existing oil and gas production activities.

Biology

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. Regional Importance of Manmade Structures as Rockfish Nurseries, MARINe, and Completion of Fish Assemblage Surveys around Manmade Structures and Natural Reefs off California contribute critical data and understanding of the roles that oil and gas activities play in the regional MARINe continues building the collection of the longest available set of data on the populations of rocky intertidal invertebrates and algae from the United States – Mexico border to the U. S. – Canada border. 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. The fish studies build upon the very successful series of research that MMS has funded investigating fish population status, feeding dynamics, and recruitment around specific oil and gas platforms.

The southern sea otter (Enhydra lutris nereis) is exceptionally vulnerable to oil spills and is 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. The proposed Southern Sea Otter Range Expansion and Habitat Use and Interaction with Manmade Structures study is important 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. MMS has previously funded extensive sea otter studies in the region.

Completing the invertebrate surveys on oil and gas platforms off California will provide MMS with needed information about the geographic distribution of rare and potentially beneficial marine invertebrates inhabiting the offshore structures. Such information is needed by MMS analysts in order to prepare NEPA documents for potential future alternate use of OCS facilities. In addition, the study responds to Presidential directives to assess invasive species in activities under MMS responsibility and follows he recommendations of a previous decommissioning studies workshop convened by the Region in 2003.

Predicting Abundance and Distribution of Seabirds and Mammals Based on Oceanographic Conditions is a proposed USGS – BRD effort that 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.

1.5 New Starts for FY 2009 and Ongoing Studies Table

Table 1. Pacific OCS Region New Starts for FY 2009 and Ongoing Studies

Program Lead	Planning Area	Start FY	Discipline	Study Title
New Starts				
MMS	SC	09	HE	Effects of EMF from Transmission Lines on Elasmobranchs and Other Marine Species
Note: The procurement of any study is contingent upon availability of funding				
ONGOING STUDIES				
Fates & Effects				
MMS	SC	06	FE	Investigation of PCB and PAH Contaminants in Samples of Platform Resident Fish
MMS	SC	06	FE	Fate, Volume and Chemistry of Natural Seeps
MMS	SC	05	FE	Volume and Chemistry of Natural Seeps in the Santa Barbara Channel
Habitat and Ecology				
MMS	SC	07	HE	MARINe – Multiagency Rocky Intertidal Network
MMS	SC	07	HE	MINT – MMS Intertidal Team
MMS	SC	04	HE	Fish Assemblages Associated with Platforms and Natural Reefs in Areas Where Data are Non-existent or Limited and Continuation
MMS	SC	03	HE	Benthic Communities on Shell Mounds
MMS	SC	04	HE	Reproductive Ecology and Body Burden of Platform Fish
MMS/NOPP	CH / BS	08	HE	Spatial and Seasonal Variation in Biomass and Size Distribution of Juvenile Fishes Associated with a Petroleum Platform
Information Management				
MMS	CA	08	IM	Update of the Summary of Knowledge
Marine Mammals and Protected Species				
MMS	SC	07	MM	Shorebird Survey of Ventura County
MMS/BRD	SC	07	MM	Comprehensive Relational Database and Web Page for Seabirds, Marine Mammals, Fish, Fisheries and Human Uses off Southern California

Physical Oceanography				
MMS	SC	08	PO	Relationship of Inner Shelf Currents to Large Scale Dynamics
Social & Economic				
Multidisciplinary				
MMS	SC	07		Environmental Mitigation Monitoring
Other (Research Partnerships)				
MMS Technology Assessment and Research Program (TAR)				
USGS Biological Resources Division (BRD)				

Discipline Codes

AQ = Air Quality FE = Fates & Effects HE = Habitat & Ecology
IM = Information Management MM = Marine Mammals and Protected Species
PO = Physical Oceanography SS = Social Sciences

Planning Area Codes

Southern California = SC Central California = CC
Northern California = NC Oregon = O
Washington = W
All = CA
http://www.mms.gov/eppd/sciences/esp/profiles/pacific.htm

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 and a more complete list of completed significant studies by the Pacific OCS Region may be found at http://www.mms.gov/omm/pacific/enviro/studies-accomplishments-2006.htm

Ongoing Operations Support Studies:
Six new studies supporting ongoing operations are proposed for FY 2010.

Regional Importance of Manmade Structures as Rockfish Nurseries

MMS MARINe – Multiagency Rocky Intertidal Network

Habitat Mapping in the Santa Barbara Channel

Completion of Fish Assemblage Surveys around Manmade Structures and Natural Reefs off California

Southern Sea Otter Range Expansion and Habitat Use and Interaction with Manmade Structures

Completion of the Invertebrate Surveys around Manmade Structures off California

2.2 FY 2010 Table

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

Page #	Discipline	Title	Rank
12	HE	Regional Importance of Manmade Structures as Rockfish Nurseries	1
14	HE	MMS MARINe – Multiagency Rocky Intertidal Network	2
16	PO	Habitat Mapping in the Santa Barbara Channel	3
18	HE	Completion of Fish Assemblage Surveys around Manmade Structures and Natural Reefs off California	4
20	MM	Southern Sea Otter Range Expansion and Habitat Use and Interaction with Manmade Structures	5
22	HE	Completion of the Invertebrate Surveys around Manmade Structures off California	6

AQ = Air Quality
FE = Fates and Effects
HE = Habitat and Ecology
MM = Marine Mammals and Protected Species
IM = Information Management
PO = Physical Oceanography
SS = Social Science

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan 2010-2012

Region: Pacific OCS Region

Planning Area: Southern California

Title: Regional Importance of Manmade Structures as Rockfish Nurseries

MMS Information Need(s) to be Addressed: The MMS will need to make decisions in future years about the fate of decommissioned platforms offshore Southern California. In order to make knowledgeable evaluations and prepare NEPA documents, an understanding of the ecological consequences of different decommissioning options (e.g. complete removal or a reefing option) must be obtained. To this end, this study proposes to assess the relative importance of shallow water platform habitat as nurseries to commercially-important rockfish species by integrating large-scale physical and biological databases. The knowledge gained from this study will allow MMS to address critical concerns raised in the University of California Blue Ribbon Science Panel on Decommissioning about the contribution of oil and gas platforms to regional marine populations. Since this study is region-wide, the cumulative effects of multiple decommissioning events on fish stocks can also be ascertained from this effort.

Cost Range: (in thousands): $400-$550 **Period of Performance:** FY 2010 - 2013

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 concerning 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 habitats. 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 addition or removal of such habitat will impact regional environments. Additionally, the knowledge gained from this study will allow MMS to address

critical 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.

This study is one of a series of platform nursery habitat studies in the POCS. The proposed study represents a critical next step in a coordinated program that extrapolates local scale studies across the entire region of interest to OCS activities. MMS-funded studies that will be integrated in this program include those describing oceanographic patterns in the Santa Barbara Channel region as well as the seafloor habitat mapping studies. Previously, MMS funded two local-scale studies on the nursery function of offshore platforms. The first study, *Assessing the Fate of Juvenile Rockfish at Offshore Platforms and Natural Reefs in the Santa Barbara Channel* NSL PC-04-02, performed a longitudinal study on the fate of juvenile rockfish if platforms were not present. During FYs 2008-2011, MMS is supporting 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 is collecting fine-scale data on the abundance and species composition of juvenile fishes recruiting to OCS facilities.

Objectives: The overall objective of this study is to perform an ecosystem-level synthesis of the POCS using region-wide oceanographic, geologic and biologic data. 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 future leasing, production or decommissioning activities to EFH and managed fish species.

Methods: 1) The contractor will update a 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) Field surveys 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 large scales; 4) the GIS will use region-wide patterns of surface currents and potential habitat layers for two overfished species, lingcod and Boccaccio, 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 12, 2009

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2010–2012

Region: Pacific OCS Region

Planning Area(s): Southern California

Title: MMS MARINe (Multi-Agency Rocky Intertidal Network)

MMS Information Need(s) to be Addressed: Ongoing monitoring of rocky intertidal sites adjacent to OCS production facilities allows MMS to directly assess potential and/or real impacts to the coastline from OCS operations. With these data, MMS can directly assess impacts to shoreline resources from OCS activities by differentiating between naturally caused impacts and other anthropogenic impacts including impacts from OCS oil and gas production and accidental oil spills. The study implements MMS's OCS Lands Act mandate to monitor the marine and coastal environment adjacent to OCS operations.

Cost Range: (in thousands) - $900 - 1100 **Period of Performance:** FY 2010-2013

Description:

Background: Potential impacts to the shoreline are of particular concern in the Pacific OCS Region because OCS operations are located very close to shore. Public concern with these impacts has a considerable effect on the program. MMS and its 40 partners in MARINe biannually monitor over 100 established shoreline rocky intertidal sites using a targeted assemblage protocol from California to British Columbia. MARINe partners also use a biodiversity protocol to sample an additional 100 plus sites from Alaska to Mexico on a periodic basis. MARINe employs standardized field protocols and a shared database (www.MARINe.gov). This study provides funding to monitor all 24 MMS long-term monitoring sites adjacent to OCS operations. MMS continues to participate actively in the management and oversight of MARINe, to access the data critical to our ongoing operations, and to fulfill our responsibility to monitor OCS platforms and pipeline operations.

A significant change documented at MARINe sites is the recent finding of juvenile black abalone at selected sites on offshore islands. This finding, while encouraging, is not sufficient to offset the need to list the black abalone as endangered (see Federal Register Notice January 14, 2009) Black abalone, throughout the area affected by withering foot syndrome, are still at the low levels (5% of the original population in the late 1980's and early 1990's) along much of the coastline. While the areal extent affected by withering foot syndrome disease has leveled off, new evidence of the disease is still being found at MMS sites in San Luis Obispo County. For many years, miles of coastline continued to be affected and the numbers of abalone fell drastically. It appears that the decline in abalone numbers continues due to a combination of loss of animals from withering foot coupled with an absence of recruitment. Evidence of withering foot syndrome was most recently observed in Central California. It seems unlikely the black abalone will recover; one of the problems limiting their recovery is the physical alteration to the community that routinely occurs after the abalone leave. No

impacts have been identified from oiling over the recent past, either from OCS or non-OCS operations.

Partnerships are also fostered with local, State and Federal government agencies involved in monitoring research. This is an important Cooperative Agreement with the State as currently the State funding has been severely cut and MMS-MARINe data are the key source of rocky intertidal information being used in Southern California to determine Marine Life Protected Areas designations/monitoring, and determining impacts to biology in Areas of Special Biological Significance. MARINe partners interact in technical conferences, government forums, and academic conferences to inform managers about the state of the rocky intertidal.

Objectives: This study will provide for the continued monitoring of 24 rocky intertidal sites on the mainland shore immediately adjacent to OCS facilities. Information generated will provide the basis for evaluating impacts to the shoreline from OCS activities, especially accidental oil spills. A web-based trend analysis of MMS funded sites in combination with other MARINe sites in the shared database, along with coordination of MARINe and database tasks are included so that MMS has access to the data needed for management decisions.

Methods: Sites are monitored biannually by 5 teams of field biologists, including the MMS MINT team. Barnacles, mussels, seastars, black abalone, surfgrass, limpets, turf weed, rock weed and other algae are either photographed in fixed plots in the field, or measured and counted in irregular, circular or band plots. The sampling protocols are standardized across MARINe and are used by all MARINe field teams. Data is placed in a common database and is reviewed and published by the Science Panel.

The most recent analysis report describing changes at MMS sites was completed in 2005 and covered data up to winter sampling 2003. It is proposed to update the analysis with data from 2003 to present in the first year of the funding. Rather than a report, however, a web-based product is planned to analyze trends at MMS sites, in combination with data at other MARINe sites in the shared database. This will allow changes at MMS sites to be evaluated in context with broader changes. Being able to evaluate changes occurring at MMS-MARINe sites in context with the changes occurring at other MARINe sites monitored in exactly the same way is what makes the MARINe monitoring program so valuable. Rocky intertidal systems are so dynamic that it is very difficult to understand the importance or cause of significant changes without this contextual analysis.

Additionally, it is also envisioned as part of this funding to explore a real-time interface, which would allow users to produce trend products interactively with the data over the web. This work will be leveraged with work from one of MMS's partners, PISCO, who has been developing a real-time interface for the biodiversity rocky intertidal data. This web-based product is timely as MMS recently updated the www. MARINe.gov website. These products are being produced in response to State and Federal managers who expressed the need to have quicker access to trends and comprehensive analyses.

Revised Date: March 13, 2009

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2010–2012

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) $250K - $350K **Period of Performance:** FY 2010-2012

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: January 22, 2009

ENVIRONMENTAL STUDIES PROIGRAM: Studies Development Plan 2010-2012

Region: Pacific OCS Region

Planning Area: Southern California

Title: Completion of Fish Assemblage Surveys around Manmade Structures and Natural Reefs off California

MMS Information Need(s) to be Addressed: Completion of this long-term data set will provide the foundational information of regional rockfish populations so that MMS can specify requirements to industry or other interested parties when they propose decommissioning.

Cost Range (in thousands): $700-850K **Period of Performance:** FY 2010 - 2012

Description:

Background: The fate of spent offshore platforms off California continues to be a subject of considerable debate. Platforms and reefs offshore the southern areas of Ventura, Los Angeles, and Orange Counties have been surveyed once or twice. Platforms off northern Santa Barbara and Ventura Counties have been surveyed multiple times with a few 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 complete 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. 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. 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 all Pacific platforms and on nearby natural reefs, 2) describing the spatial and temporal patterns of fish diversity, density and size distribution among habitat types, and 3) completion of the 15 year data-set so that trend analyses or synthesis documents can be produced in the future.

Methods: A multiple-year fish survey of platforms and nearby natural outcrops using the same methodology used over the past 13 years. Identical methodology will ensure future comparability of data.

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: March 13, 2009

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2010-2012

Region: Pacific OCS Region

Planning Area: Southern California

Title: Southern Sea Otter Range Expansion and Habitat Use and Interaction with Manmade Structures

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): $300-400 **Period of Performance:** FY 2010 - 2013

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: March 26, 2009

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2010-2012

Region: Pacific OCS Region

Planning Area: Southern California

Title: Completion of the Invertebrate Surveys around Manmade Structures off California

MMS Information Need(s) to be addressed: This study will complete a survey of oil and gas platforms offshore southern California and provide MMS with needed information about the geographic distribution and diversity of rare and potentially beneficial marine invertebrates as well as invasive species inhabiting the offshore structures. Such information is needed by MMS analysts in order to prepare NEPA documents for potential future alternate use of OCS facilities. In addition, previous research indicates that several invertebrates living on these structures have significant biopharmaceutical potential and as such MMS needs to be prepared to assess platforms for potential alternate uses.

Cost Range: (in thousands) $300-400 **Period of Performance:** FY 2010–2012

Description:

Background: The MMS recently completed a survey of seven oil and gas platforms in the Santa Barbara Channel (Page and Dugan, 200__). The platforms were sampled for invertebrates and algae and these were identified to the lowest possible taxon (usually species level). Genetic analyses were also performed on selected species that were sampled from different platforms. Both species differences among platforms and genetic differences with a single species were discovered. This study was part of a larger effort to identify invertebrates or algae which might have biological or pharmaceutical potential for human health. A few species collected and tested showed significant potential for possible use as sources of anti-cancer compounds or immunosuppressant compounds. One of the significant species with pharmacological potential is a bryozoan, Watersipora. It is an invasive species and appears to be expanding is community on the single platform on which it was located. There are presently undocumented reports of this species elsewhere on offshore platforms. The full geographic range of the platforms in Southern California has not been sampled for these invertebrates or algae.

Objectives: The objective of this study is to sample the remaining unsampled oil and gas platforms offshore Southern California including those in the most southerly Beta Unit and analyze the full geographic diversity of invertebrates and algae on the oil and gas platforms throughout the region.

Methods. The methods used will be similar to those used in the previous study. SCUBA diving will be employed predominantly to sample the oil and gas platforms for invertebrates and algae. Vouchered specimens will be examined in the laboratory by taxonomic experts and

classified to the lowest possible taxon. The organisms collected will also be compared to those species previously collected. Genetic analyses of selected species will be done by the methods employed in the previous study.

Revised Date: January 14, 2009

2.3 FY 2011 Table

Table 3. Pacific OCS Region Studies Proposed for the Fiscal Year 2011 NSL

Page #	Discipline	Title
25	MM	Predicting Abundance and Distribution of Seabirds and Mammals Based on Oceanographic Conditions
27	HE	Distinguishing Between Human and Natural Causes of Change in Nearshore Ecosystems Using Long-term Data from DOI Monitoring Programs
29	HE	Description of Benthic Communities for the Point Arena Basin, Northern CA

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2010-2012

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 - $250 **Period of Performance:** FY 2011–2013

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 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.

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: Jan 5, 2009

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2010-2012

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 and predicting the potential impacts of OCS oil/gas and alternative energy production on nearshore ecosystems requires an ability to distinguish between changes caused by natural processes verses 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 energy activities and develop options to mitigate these impacts. This is especially important to MMS in light of global climate change and the need to understand the cumulative impacts of multiple projects on the OCS.

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/gas and alternative energy 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.

The MMS requires information about the sensitivity and resilience of biological habitats to disturbance to perform environmental analyses. 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 energy 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 sensitive nearshore 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 Fishery 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. 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 adaptive management, both of which are goals central to DOI stewardship responsibilities and trust resources.

Objectives: The ultimate goal is to understand the natural range and sources of variability in the kelp forest ecosystem well enough to generate predictions on how it will respond to environmental change and to enable scientists and managers to evaluate possible impacts from offshore oil/gas and alternative energy production, and develop options to mitigate these impacts. To this end, 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 on the abundance, species composition, and trophic structure of kelp forest communities, (2) resilience of the community to varying levels of 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, and compiled data and metadata that are archived in an accessible format that facilitates future syntheses and environmental analyses required under the National Environmental Policy Act.

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 at six kelp forest sites around San Nicolas Island since 1980. The NPS has been collecting similar data at 16 sites within the Channel Islands National Park 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: January 15, 2009

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2010-2012

Region: Pacific OCS Region

Planning Area: Northern California

Title: Description of Benthic Communities for the Point Arena Basin, Northern CA

MMS Information Need(s) to be Addressed:

To responsibly manage the ocean energy resources on the Outer Continental Shelf, MMS requires knowledge of the seafloor environment that may be affected by offshore oil and gas activities. The recently released Proposed Draft Comprehensive Five Year Leasing Program includes Point Arena Basin offshore northern California. This area is poorly described with regard to seafloor habitats and biological communities. A broad reconnaissance benthic survey will provide MMS analysts with essential information on benthic communities for use in NEPA documents for leasing, exploration and development activities. The information will also provide data to analyze future alternative energy projects.

Cost Range: (in thousands): $400-$600 **Period of Performance:** FY 2011 - 2014

Description:

Background: Seafloor reconnaissance of habitat and biological communities are an essential component to leasing and developing the Pacific OCS. Multiple studies were funded throughout the late 1970s and 1980s, which were all initiated from reconnaissance surveys using trawls and grab transects. One reconnaissance study for central and northern California was funded by MMS, finishing in 1989, that included 5 transects on the continental shelf of the Point Arena Basin. The Point Arena area was singled out as an area with hard substrate relief above 3 meters and correspondingly unique animal communities. Additional surveys are needed for future leasing, exploration and development because over the past 20 years, regional oceanic patterns may have changed due to global climate change in that area causing more frequent low oxygen conditions. Oxygen is a fundamental factor in structuring seafloor communities and so may have dramatic effects on species compositions. The tools for visualizing seafloor habitats has also advanced and high resolution seafloor mapping is extensive for the Mendocino Ridge area at the northern border of the basin and mapping is currently ongoing in state waters. These efforts will further help to successfully target areas for sampling in Federal waters.

Objectives: The overall objective of this study is to provide MMS with a basic description of the common benthic organisms and major seafloor habitats that exist in the Point Arena Basin and whether these communities are unique, rare, or more widely distributed.

Methods: The Contractor will synthesize spatial seafloor information available for the area to a common format that is readily accessible to MMS staff. Contractor and MMS staff will prioritize limited areas to be surveyed based on resources potential and previous survey data. Survey methods will include a variety of benthic sampling devices appropriate to the substrate targeted for sampling (e.g. box cores, ROV with remote arms, trawls). Samples will be identified to the lowest possible taxon and community species assemblages described.

Revised Date: January 20, 2009

SECTION 3.0 TOPICAL AREAS for FISCAL YEAR 2012

Alternative Energy and Alternate Use

Offshore wind and wave energy may supplement oil and gas supplies and provide a renewable energy source. Studies are currently being performed to gather information for future projects along the Pacific Coast to assess new technology offshore California, Oregon, and Washington, identify suitable areas and conditions, and examine regional environmental effects. Additional studies are being proposed through the Alternative Energy Program Studies Development Plan for FY 2010 – 2012. These include marine mammal and seabird bird surveys, benthic surveys offshore potential alternative energy sites, and updated marine archaeological and cultural sites digitized databases.

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 the study of a larger network of sites across the Pacific coastline for many years (MARINe, the Multi-agency Rocky Intertidal Network). MMS has also been leading a sub-committee of MARINe for the past two years, tasked with identifying bioindices or measurements which can be used predictably to determine relative health of a given rocky intertidal site. It is anticipated that once these bioindices are developed, MMS could look at a subset of the larger dataset, just the oldest MMS-MARINe sites in the Santa Barbara Channel, and develop a "report-card" style ranking of sites which would inform managers about the health of the rocky intertidal communities in the Santa Barbara Channel. This pilot would function to identify potential data gaps, and other issues which hinder our ability to assign a "grade" to a site. MMS could 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.

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 State of California has issued an RFP for a study of the value of oil and gas platforms to regional fish ecology and the effects of a variety of decommissioning options. MMS is serving on the expert panel for that study. The findings from that state effort should be continued to be supported by completing ongoing MMS research and 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.

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